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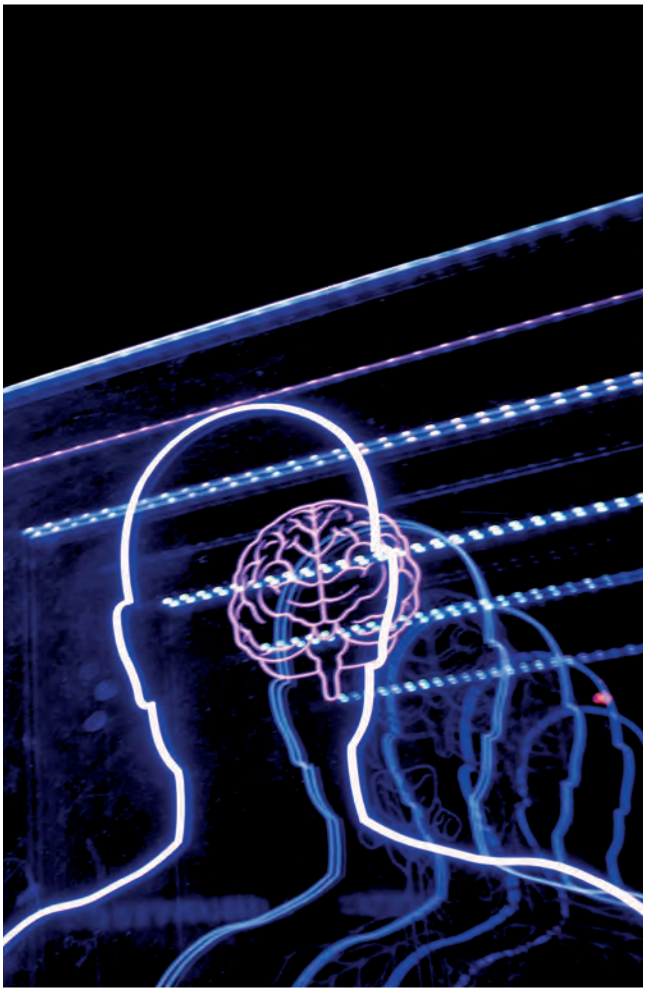

Using testimonial narratives to persuade people about artificial intelligence: the role of attitudinal similarity with the protagonist of the message

Juan-José Igartua; Alejandro González-Vázquez; Carlos Arcila-Calderón

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Abstract

This study addresses the factors that increase the persuasive impact of testimonial narrative messages on artificial intelligence (AI). In particular, the effect on two variables that, to date, have not been explored in this field is analyzed: the attitudes toward AI (positive versus ambivalent) expressed by the protagonist of the narrative message (a testimonial in audiovisual format) and the role of participants' prior beliefs about AI. An online experiment (*N* = 652) was carried out to contrast the effect of attitudinal similarity on identification with the protagonist of the narrative message and the indirect effect on attitudes and intention to use AI. The results showed that the message whose protagonist expressed positive attitudes toward AI induced greater identification only in those participants with previous positive beliefs. In contrast, the message whose protagonist expressed ambivalent attitudes toward AI induced greater identification only among participants with previous negative beliefs. In addition, identification and cognitive elaboration were found to mediate the effect of attitudinal similarity on the attitude toward and intention to use AI. These findings are discussed in the context of narrative persuasion research and the development of campaigns for improving social perceptions of data science.

Keywords

Narrative persuasion; Audience–character attitudinal similarity; Identification with characters; Cognitive elaboration; Artificial intelligence; Attitudes toward artificial intelligence; Media Psychology.

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1. Introduction

Artificial intelligence (AI) can be defined as computer systems that can make predictions, recommendations, or decisions and select information autonomously using algorithms and has been considered as one of the promising technological breakthroughs of the twenty-first century (**Samoili** *et al.*, 2020). Its implementation in both the private and public sectors has captured the interest of media and citizens: from disaster or emergency management, through its use as a diagnostic and predictive tool in medicine, economics, or even the entertainment industry, to military applications. Its presence across society means that most citizens are having contact with such systems to some extent in their daily life, which in turn triggers a legitimate social criticism and a focused debate about the benefits and risks of these technologies. It is here that attitudes toward and beliefs about AI come into play, ranging from optimistic expectations to perceptions of threat and risk associated with security, autonomy, interpersonal relationships, and loss of status (**Olhede**; **Wolfe**, 2018). These beliefs or expectations regarding the benefits or risks of AI directly influence the degree of use and social relevance of these technologies (**Lichtenthaler**, 2020; **Schepman**; **Rodway**, 2020; **Sindermann** *et al.*, 2021; **Venkatesh** *et al.*, 2003). However, as in the case of other scientific advances (e.g., nuclear power, biotechnology, and some medical and environmental technologies) some of the negative expectations of AI might be based on misinformation, lack of accurate knowledge or even unrealistic ideas from science fiction, but are also based on legitimate concerns regarding the governance of these technologies (**Cave**; **Dihal**, 2019). This makes relevant the study of strategies that can change the negative attitudes produced by non-scientific facts (**Dahlstrom**; **Ho**, 2012).

In fact, few studies have addressed the social perception of and attitudes toward AI, mostly focusing on specific fields of application such as the financial and government sectors (e.g., **Granulo**; **Fuchs**; **Puntoni**, 2019; **Makridakis**, 2017; **Sáez**; **Costa-Soria**, 2019) or health (e.g., **Dos-Santos** *et al.*, 2019; **Vayena**; **Blasimme**; **Cohen**, 2018). The works of **Cave** & **Dihal** (2019) and **Cave**, **Coughlan** & **Dihal** (2019) identified the most common and recurrent narratives in UK public opinion regarding AI. Thus, the most optimistic perspective values the ability of AI to improve people's well-being and health by facilitating the performance of routine tasks, or their capacity as artificial assistants. In contrast, the most pessimistic expectations indicate the risk of the gradual alienation of society due to the displacement of humans in both work environments and interpersonal relationships, to the point of reaching an excessive or even dangerous degree of dependence on this technology. These works reveal a presumably growing problem regarding the controversial social perception of data science and AI, especially in relation to all the unfounded negative beliefs and attitudes that can lead to rejection of these technologies. This fact justifies the need to develop tools to detect and delineate the nature of such attitudes (e.g., **Schepman**; **Rodway**, 2020; **Sindermann** *et al.*, 2021). More importantly, it also becomes necessary to develop effective communication strategies aimed at generating an attitudinal change toward AI that will facilitate its correct assessment and use.

The current work starts from the idea that the use of brief testimonial narrative messages could be an important tool to attitude formation and change toward AI, since they can be easily distributed and go viral on social networks. In fact, a recent meta-analysis confirmed that exposure to narrative messages has a significant impact on attitudes (r = .19) and behavioral intention (r = .17), two of the main dependent variables in the current research (**Braddock**; **Dillard**, 2016). In this context, this is one of the first studies on the use of narrative messages in the field of AI. The current experiment was carried out to analyze the effect of the attitude toward AI of the protagonist of an audiovisual testimonial message and the role of the participants' prior beliefs on the topic. This enables an exploration of the effect of attitudinal similarity and an analysis of the role of two psychological mechanisms relevant to research on narrative persuasion: identification with the protagonist (**Cohen**, 2001) and cognitive elaboration (**Hoeken**; **Fikkers**, 2014; **Igartua**; **Vega**, 2016)..

> Due to the existence of unfounded negative beliefs and attitudes that can lead to rejection of AI, it becomes necessary to develop effective communication strategies aimed at generating an attitudinal change toward these technologies

2. Narrative persuasion

Empirical research during the last two decades has demonstrated that narrative messages, as opposed to purely informational messages (that is, with a format limited to the presentation of objective data with an overtly persuasive intent), exert an important effect on the attitudes, beliefs, and behaviors of their recipients (**Braddock**; **Dillard**, 2016), thus providing a useful tool for the development of interventional campaigns in a multitude of areas (e.g., **Barriga**; **Shapiro**; **Fernandez**, 2010; **Bilandzic**; **Kinnebrock**; **Klinger**, 2020; **Cohen**; **Tal-Or**; **Mazor-Tregerman**, 2015; **Morris** *et al.*, 2019; **Wojcieszak** *et al.*, 2017). However, one of the great challenges in research in this field is to identify the characteristics of the messages that can improve their persuasive potential (**Braddock**; **Dillard**, 2016). Previous work that analyzed various factors conditioning the persuasive impact of narrative messages (e.g., **Tal-Or**; **Cohen**, 2015; **Tukachinsky**, 2014) emphasized the role of the characteristics of the messages (such as the narrative voice or the point of view from which the story is told; **Chen**; **Bell**, 2021; **Igartua**; **Rodríguez-Contreras**, 2020; the placement of relevant information within the narrative; **Dahlstrom**, 2010), or the attributes or characteristics of their protagonists (such as objective similarity; **Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018; **Ooms**; **Hoeks**; **Jansen**, 2019). The current work focuses on the role of the similarity between the audience and the protagonist of the message, because of its ability to stimulate greater identification.

> The current work starts from the idea that the use of brief testimonial narrative messages could be an important tool to attitude formation and change toward AI

3. Attitudinal similarity and identification with the protagonist

Similarity occurs when a person exposed to a narrative message shares certain characteristics with its protagonist. For example, a high level of similarity occurs when a message whose protagonist is a 20-year-old is received by a person aged 18–22 years, where the similarity is low if it is received by a person aged 40–50 years. There is an open debate regarding the role of similarity in increasing identification and, indirectly, fostering persuasive impact. According to the *similarity–identification hypothesis* (**Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018), people form more intense affective and cognitive bonds with protagonists of narrative messages who are similar in demographic, social, or psychological terms. However, studies carried out to date have found inconclusive results on this hypothesis (**Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018; **Hoeken**; **Kolthoff**; **Sanders**, 2016; **Ooms**; **Hoeks**; **Jansen**, 2019; **Tukachinsky**, 2014).

Most work in which similarity with the protagonist of a message has been manipulated has focused on objective demographic attributes such as sex or age (e.g., **Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018; **De-Graaf**, 2014; **Hoeken**; **Kolthoff**; **Sanders**, 2016), whereas little work has been carried out on the effect of similarity in terms of psychological or subjective characteristics (such as personality, attitudes, values, or biographical experiences) (**Cohen**; **Hershman-Shitrit**, 2017). In this context, the aim of the current work is to make a theoretical adjustment to the concept of similarity by expanding its conceptual domain to include an aspect not analyzed to date in research on narrative persuasion: attitudinal similarity.

Attitudes are relevant in research on narrative persuasion, not only because they are one of the main outcome variables (dependent variables) of studies in this field, but also because narrative messages always explicitly or implicitly present an attitude or series of beliefs on a specific topic, in either a central or peripheral way. Narratives have been defined as a type of message including at least one character who experiences or faces an event (or broader set of situations) in a specific space–time frame. In addition, narratives must communicate something relevant to the audience, who can extract a lesson from them (**Braddock**; **Dillard**, 2016; **Hoeken**; **Kolthoff**; **Sanders**, 2016). This means that each narrative message introduces an attitudinal proposal, and it is indeed its protagonists who express a point of view, manifest a series of beliefs, or propose a perspective on the central theme of the message. This is particularly important for first-person testimonial messages (**Chen**; **Bell**, 2021), in which the protagonist addresses the reader or viewer directly to tell their story, recount their personal experiences, or (explicitly or implicitly) communicate a positive, negative, or ambivalent attitude toward a certain social object.

In this context, the current study focuses on the effect of attitudinal similarity, i.e., the match between the protagonist's attitude toward a social object (in this case, AI) and the participants' prior beliefs about it. Here, *high attitudinal similarity* can be considered to apply when a person who expresses positive beliefs about AI views a testimonial video whose protagonist clearly or consistently expresses positive beliefs about or attitudes toward AI in a particular domain (in this case, the management of medical appointments through an intelligent system instead of by phone). Moreover, high attitudinal similarity also occurs when the person receiving the message manifests negative or ambivalent beliefs about AI and views a testimonial message whose protagonist shows an ambivalent attitude toward the use of AI in the health management context. On the other hand, a situation of *low attitudinal similarity* occurs when a person with positive beliefs about AI views a message whose protagonist is ambivalent about the topic, or when a person with negative beliefs views a testimonial message whose protagonist shows a very positive attitude toward AI.

Social identity theory and self-categorization theory (**Tajfel**, 1982; **Turner**, 1985) suggest that people tend to categorize those they perceive to be similar as members of the ingroup, and those they perceive to be different as members of the outgroup. This leads to different reactions toward ingroup and outgroup members (**Gaertner** *et al.*, 1993), even when processing narrative messages (**Igartua**; **Wojcieszak**; **Kim**, 2019; **Kaufman**; **Libby**, 2012). In this context, we assume that, if certain *cues* are activated in the narrative message about the attitude of its protagonist toward AI (for example, reporting positive experiences on its use), identification may be more easily promoted as long as there is an *attitudinal match*, which in this case would suppose that the person receiving the message also manifests positive prior beliefs about AI.

> The objective of the present investigation is to provide empirical evidence regarding the efficacy of narrative persuasion models as a tool for changing attitudes toward Data Science and AI

4. Underlying processes: Identification and cognitive elaboration

The main theoretical models on narrative persuasion consider that identification with the protagonist of a narrative fosters persuasive impact through a process that inhibits *resistance* to the persuasive proposal of the message, thereby facilitating its attitudinal impact (**Moyer-Gusé**, 2008; **Slater**; **Rouner**, 2002). That being said, the empirical evidence on the role of counterarguing (the production of critical cognitive responses that refute the content of a message; **Niederdeppe** *et al.*, 2012) and reactance (reacting negatively to a message by perceiving that freedom of choice or opinion is threatened; **Rains**, 2013) is not conclusive, leading to the proposal of alternative models that give greater weight to cognitive elaboration (**De-Graaf**; **Van-Leeuwen**, 2017; **Igartua**; **Vega**, 2016; **Walter**; **Cohen**, 2019). In any case, the role of cognitive elaboration in narrative persuasion processes has been less investigated to date than the role of message resistance processes (**De-Graaf**; **Van-Leeuwen**, 2017). The current work therefore makes a significant contribution to understanding the role of identification and cognitive elaboration in narrative persuasion processes.

Identification is an imaginative process that has been defined as a multidimensional construct linked to emotional empathy, cognitive empathy, and a feeling of merging with the character and adopting their goals (**Cohen**, 2001; **Igartua**; **Barrios**, 2012). This constitutes a psychological phenomenon by which audience members mentally adopt the position of the protagonist of the narrative message and thereby *borrow* their attitudes and beliefs (**Cohen**; **Tal-Or**, 2017). Meanwhile, cognitive elaboration is defined as a process of reflection on the content of a message and provides a measure of the intensity with which the topic is reflected on during the reception process (**Igartua**; **Vega**, 2016; **Petty**; **Cacioppo**, 1996). **Cohen** (2001) states that identification is a process of *temporary involvement* with the message, and therefore it is possible that it increases cognitive elaboration during its reception. In this context, we consider that the experience narrated in a message by a positive role model (in our case, about their experience with AI in health management) can serve as inspiration and stimulate deep cognitive processing in people, so that they question their prior opinions and *adjust* their attitudes toward AI.

Previous evidence on this topic is scarce but corroborates this approach. Indeed, it has been observed that identification increased cognitive elaboration, which in turn enhanced the attitudinal impact (**Igartua**; **Vega**, 2016). However, those results were obtained in the context of education-entertainment research, using complex messages that incorporated attitudinal proposals with clear health benefits for individuals. However, the current research uses testimonial narrative messages that incorporate an attitudinal proposal with no apparent benefit for individuals (that is, improving attitudes toward AI). In this context, our work aims to provide evidence on the role of cognitive elaboration as a *secondary mediator mechanism* dependent in turn on the identification process.

> The current work focuses on the role of the similarity between the audience and the protagonist of the message, because of its ability to stimulate greater identification facilitating its attitudinal impact

5. Objectives and hypotheses

The objective of the present investigation is twofold. The first, and more general, aim is to provide empirical evidence regarding the efficacy of narrative persuasion models as a tool for changing attitudes toward Data Science and AI, in order to serve as a starting point for the development of strategies to bring this kind of technology closer to the general population and counteract the discourses of rejection and mistrust. The second aim is to study in greater depth the various mechanisms responsible for narrative persuasion processes, paying special attention to the role of attitudinal similarity as a psychological *trigger* of identification with the protagonist. In this context, it is suggested that attitudinal similarity could be a key element for increasing identification with the protagonist of a testimonial message. In the current experiment, the attitude toward AI (positive versus ambivalent) of the protagonist of a testimonial audiovisual message was manipulated. In addition, the participants completed a pre-test measure (before viewing the testimonial videos) to evaluate their previous beliefs about AI. The following research hypotheses are hence proposed:

H1a. The testimonial message whose protagonist shows a positive attitude toward AI will induce greater identification than that in which the protagonist maintains an ambivalent attitude, but this effect will occur only among people with positive prior beliefs about AI.

H1b. The narrative message whose protagonist shows an ambivalent attitude will generate greater identification than that in which the protagonist expresses positive attitudes toward AI, but only among people with negative prior beliefs about AI.

We also establish the following hypotheses to analyze the role of identification with the protagonist as a mediating mechanism of the effect of attitudinal similarity with the protagonist on attitudes toward and intention to use AI:

H2. The testimonial message whose protagonist shows a positive attitude toward AI will induce greater identification than that in which the protagonist maintains an ambivalent attitude, and this, in turn, will be associated with a more positive attitude toward (H2a) and a greater intention to use AI (H2b), although this indirect effect will only appear in people with positive prior beliefs about AI.

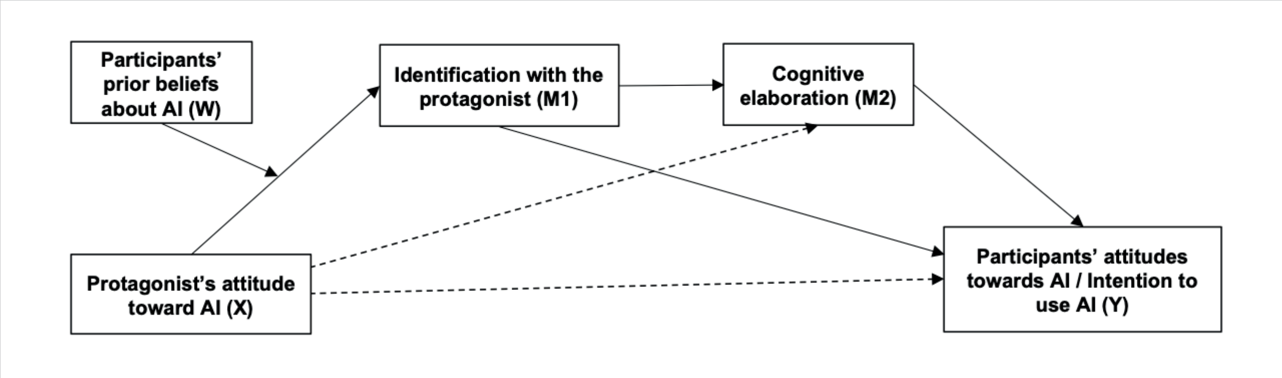


Figure 1. Hypothesized moderated serial multiple mediation model (H2 & H3)

Finally, the role of identification with the protagonist and cognitive elaboration as mediators acting in sequence is analyzed, and the indirect effect of attitudinal similarity with the protagonist on attitudes toward and intention to use AI is analyzed by establishing a moderated serial multiple mediation model (see Figure 1).

> H3. The testimonial message whose protagonist shows a positive attitude toward AI will induce greater identification than that in which the protagonist maintains an ambivalent attitude, and this will be associated with greater cognitive elaboration, which, in turn, will be associated with a more positive attitude toward (H3a) and a greater intention to use AI (H3b), although this indirect effect will only appear in people with positive prior beliefs about AI.

6. Method

6.1. Procedure and participants

An online experiment was carried out using *Qualtrics* to access a panel of 652 people of Spanish origin, setting gender and age quotas to achieve a representative sample of the Spanish population (50.6% men; M_{age} = 39.81 years, *SD* = 11.47 years, range 18–65 years).

The online questionnaire consisted of three blocks: pre-test measures, experimental manipulation, and post-test measures. The first block collected information on sociodemographic variables (gender, age, educational level, and employment status) as well as previous beliefs about AI (moderating variable) and the degree of use of said technology. Then, in the second block, the participants were randomly assigned to one of four possible experimental conditions, according to a 2 (attitude of the protagonist toward AI) × 2 (demographic similarity with the protagonist) between-subjects factorial design. The participants viewed an audiovisual piece consisting of a testimonial message whose protagonist narrated their past and present experiences with AI in various fields. After viewing the testimonial audiovisual message, the post-test measures were presented using questions to evaluate the effectiveness of the experimental manipulation of demographic similarity, as well as self-report measures on the mediating variables (identification with the protagonist and cognitive elaboration) and dependent variables (attitudes toward and intention to use AI).

The relevant independent variable of this study was the attitude manifested by the protagonist of the narrative message toward AI, while demographic similarity was introduced into the design to increase the external validity of the study (assuming the role of a covariate), because people are usually exposed to narrative messages that lack demographic matching. The present design therefore addresses one of the main criticisms of experimental research in media psychology, i.e., the use of a single message per experimental condition (**Reeves**; **Yeykelis**; **Cummings**, 2016; **Slater**; **Peter**; **Valkenburg**, 2015). In this study, instead of only two narrative audiovisual messages (depending on the protagonist's attitude toward AI), eight messages were created such that participants viewed messages with or without demographic matching between the gender and age of the protagonist of the message and the participants themselves. An additional condition in which the protagonist of the message expresses an unambiguously negative attitude toward AI could also exist. However, since the aim of this work is to explore the potential of narrative messages to raise awareness about the benefits of AI, this possibility was not considered in the present work.

The calculation of the sample size depends on several factors such as the type of design, the effect size observed in previous studies (or in meta-analysis reviews), the type I error (α), and the statistical power (1 – β). **Braddock** and **Dillard**'s (2016) meta-analysis was considered to obtain a measure of the effect size. Thus, assuming an effect size of *r* = .17, an α value of .05, a power of .80, and a four-group design, the G*Power program (**Faul** *et al.*, 2007) indicated that a sample size of 384 participants was necessary. The study was thus designed to access a sample of this size or slightly larger.

> We consider that the experience narrated in a message by a positive role model can serve as inspiration and stimulate deep cognitive processing in people, so that they question their prior opinions and *adjust* their attitudes toward AI

Since *Qualtrics* enables the application of a series of quality controls, the questionnaire was designed such that it could only be completed in a single session. In addition, we only counted as valid cases those participants who took between 65 and 120 seconds (*M* = 87.12 seconds, *SD* = 9.67 seconds) to view the testimonial narration (with duration 66–79 seconds) and who correctly answered a control question included in the questionnaire.

6.2. Independent variables and experimental stimulus materials

Based on the aforementioned studies as a reference as well as collaboration and advice from experts in AI and data science, a series of audiovisual pieces were produced in testimonial format. In the first part of the testimonial video, the protagonist stated that they had always had an attitude of trust and acceptance (versus mistrust and rejection) toward the use of AI. In the second part of the video, the protagonist described that they had recently needed to resort to AI and had obtained good results. Specifically, the protagonist commented that, after several unsuccessful attempts through traditional channels (by phone), they had managed to make an urgent medical appointment with the help of AI (virtual web assistant). In this way, the narrative message connected two attitudes toward AI (consistently positive, or ambivalent with a positive end result) in a temporal causal chain. In this way, the constructed narrative message referred to two different *states*, the first related to previous experiences (negative or positive) with AI, and the second related to a recent positive experience with said technology (defining AI as a useful, simple, and effective tool), with the two events connected in a *causal temporal sequence*. In addition, in the narrative, the protagonist mentioned the reasons that led them to use AI recently, alluding to their perceptions about said technology and communicating their expectations for the future (*intentions and goals of the character*).

In addition to considering the protagonist's attitudes toward AI, different versions of each experimental condition were constructed depending on the protagonist's demographic characteristics. Four protagonist profiles were established: a 30-year-old man, a 30-year-old woman, a 50-year-old man, and a 50-year-old woman, being assigned fictitious names that are common in Spain (Antonio and Maricarmen). In this way, each participant was randomly presented with an audiovisual piece whose protagonist had high demographic similarity (for example, a male participant aged 18–39 years viewed the piece with a 30-year-old man as protagonist) or low demographic similarity (in the same example, the participant viewed a piece with a 50-year-old woman as protagonist). The actors and actresses were selected in a previous pilot study, in which they were evaluated in terms of phenotypic representativeness of the Spanish population and having desirable characteristics such as attractiveness or generating trust and sympathy.

Overall, a total of eight versions of the same audiovisual piece were finally produced, varying only in the type of narrative message and the demographic characteristics of the protagonist. The other elements of the narrative remained identical in all the versions, as well as the stage, props, sound, and lighting used in each audiovisual piece.

6.3. Measures

Beliefs about AI

To evaluate the general previous beliefs (positive and negative) about AI, we took as reference the scale developed by **Cave**, **Coughlan** & **Dihal** (2019) composed of eight items evaluated on Likert-type scales (e.g., "Artificial Intelligence could revolutionize medicine to the point of greatly increasing our life expectancy"; 1 = totally disagree, 7 = totally agree; α = .79; *M* = 4.12, *SD* = 0.64).

Use of AI

In this case, we used a scale constructed based on the work of **Sáez** & **Costa-Soria** (2019) and **Sindermann** *et al.* (2021), composed of six items evaluated with 5-point rating scales on the habitual use of the different forms of said technology (e.g., "To what extent do you make habitual use of virtual assistants such as Siri, Alexa, Aura, or Cortana?"; 1 = not at all, 5 = a lot; α = .77; *M* = 3.28, *SD* = 0.84).

Perceived similarity

To test the effectiveness of the manipulation of demographic similarity, immediately after viewing the narrative message, the participants completed a scale based on the work of **Ooms, Hoeks** & **Jansen** (2019), made up of four items evaluated on Likert-type scales (e.g., "Antonio [Maricarmen] has demographic characteristics such as sex or age that are very similar to mine"; 1 = totally disagree, 7 = totally agree agreement; α = .86; *M* = 4.36, *SD* = 1.45).

Identification with the protagonist

Identification with the protagonist was measured using a scale developed by **Igartua** & **Barrios** (2012), consisting of 11 items evaluated with 5-point rating scales (e.g., "While viewing the video I felt as if I were Maricarmen [Antonio]"; 1 = not at all, 5 = a lot; α = .94; *M* = 3.24, *SD* = 0.93).

Cognitive elaboration

To measure the degree of cognitive elaboration, the scale developed by **Igartua** & **Vega** (2016) and **Igartua** & **Rodríguez-Contreras** (2020) was adapted to the AI field, being composed of three items evaluated on Likert-type scales (e.g., "While I viewed the video, I reflected intensely on the subject of artificial intelligence"; 1 = totally disagree, 7 = totally agree; α = .92; *M* = 4.93, *SD* = 1.41).

Attitude toward AI

This was evaluated using a scale developed by **Schepman** & **Rodway** (2020), comprising 16 items related to different benefits and perceptions of AI (e.g., "Artificial Intelligence can have a positive impact on people's well-being," "Artificial intelligent systems can perform better than humans," "For routine transactions, I would rather interact with an artificial intelligent system than with a person"; 1 = totally disagree, 7 = totally agree; $\alpha = .93$; $M = 4.99$, $SD = 1.05$).

Intention to use AI

To capture the behavioral component of the attitude toward AI, an ad hoc scale made up of six items evaluated on Likert-type scales was used (e.g., "I would not mind interacting with artificial intelligence the next time I need to carry out an administrative task"; 1 = totally disagree, 7 = totally agree; $\alpha = .90$; $M = 5.05$, $SD = 1.28$).

All the materials related to the experiment (dataset and syntax files, measures, and audiovisual narratives) are available via the *Open Science Framework* (*OSF*):
https://osf.io/n7yku/?view_only=0c09003e7904480ab41f47abbf3766ea

7. Results

7.1. Preliminary analysis

Randomization was successful: the experimental conditions did not differ significantly on gender ($\chi^2(3, N = 652) = 0.19$, $p = .979$), age ($F(3, 648) = 0.67$, $p = .566$), educational level ($\chi^2(12, N = 652) = 12.86$, $p = .379$), employment status ($\chi^2(12, N = 652) = 8.85$, $p = .715$), prior beliefs about the future of AI ($F(3, 648) = 0.98$, $p = .400$), or perceptions regarding the usefulness of AI ($F(3, 648) = 0.63$, $p = .596$).

> In our experiment, a total of eight versions of the same audiovisual piece were finally produced, varying only in the type of narrative message and the demographic characteristics of the protagonist

We also checked whether the experimental manipulation of demographic similarity (based on gender and age) was effective, taking into account the two variables of perceived similarity and identification with the protagonist. It was found that people assigned to the high-similarity condition ($M = 4.82$, $SD = 1.30$) showed greater perceived similarity with the protagonist of the message than those assigned to the low-similarity condition ($M = 3.88$, $SD = 1.45$) ($t(650) = -8.63$, $p < .001$). However, demographic similarity did not significantly influence identification with the protagonist ($t(650) = -1.64$, $p = .101$), although the mean was higher in the high-similarity ($M = 3.30$, $SD = 0.95$) than low-similarity condition ($M = 3.17$, $SD = 0.92$). These results are convergent with those obtained in previous studies (e.g., **Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018) and are also consistent with the meta-analysis review by **Tukachinsky** (2014), who concluded that demographic similarity does not influence identification but does affect perceived similarity.

7.2. Hypothesis 1: effect of attitudinal similarity on identification with the protagonist

To test the first hypothesis, the PROCESS macro by **Hayes** (2022) was used, applying model 1 (simple moderation). In this model, the attitude of the protagonist of the message toward AI was included as a predictor variable (–0.5 = ambivalent attitude, 0.5 = positive attitude), prior beliefs about AI were included as a quantitative moderating variable, and demographic similarity with the protagonist (–0.5 = low similarity, 0.5 = high similarity) was included as a covariate.

The interaction between the attitude toward AI manifested by the protagonist of the testimonial message and the participants' prior beliefs about AI was found to have a statistically significant effect on identification ($B = .32$, $SE = .11$, $p = .004$). The analysis of the conditional effects showed that the message whose protagonist showed positive attitudes toward AI (compared with the message whose protagonist showed ambivalent attitudes) induced greater identification only among people with prior positive beliefs about AI ($\vartheta_{\text{Protagonist's attitude} \rightarrow \text{Identification}|(\text{Positive beliefs about AI})} = .27$, $SE = .11$, $p = .003$), but not in those who showed a negative ($\vartheta_{\text{Protagonist's attitude} \rightarrow \text{Identification}|(\text{Negative beliefs about AI})} = .05$, $SE = .07$, $p = .421$) or ambivalent attitude ($\vartheta_{\text{Protagonist's attitude} \rightarrow \text{Identification}|(\text{Ambivalent beliefs about AI})} = -.08$, $SE = .09$, $p = .387$).

In addition, the Johnson–Neyman technique was used to determine the region(s) of significance of the effect of the attitude of the protagonist of the message toward AI on identification for the different values of the participants' prior beliefs about AI. Two regions of significance were observed. First, the attitude of the protagonist of the message toward AI had a positive effect on identification among people with more positive beliefs about AI (with scores greater than or equal to 4.26, representing 32.82% of the participants). This implies that people with positive beliefs about AI identified more with the narrative message whose protagonist showed clearly positive attitudes than with the protagonist who showed an ambivalent attitude, which is in accordance with H1a. Secondly, the attitude of the protagonist of the message toward AI had a negative effect on identification among people with more negative beliefs about AI (with scores less than or equal to 2.83, representing 1.53% of the participants). This implies that people with negative beliefs about AI identified more with the protagonist who showed an ambivalent attitude than with the protagonist who showed a positive attitude, which is in accordance with H1b (see Figure 2). These results allow us to conclude that attitudinal similarity was a relevant factor to increase identification with the protagonist.

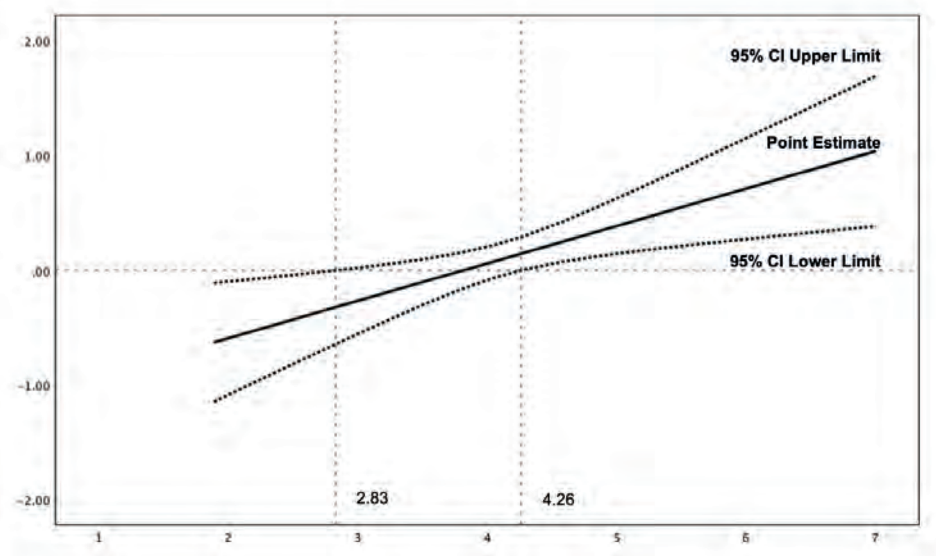


Figure 2. Johnson–Neyman regions of significance for the conditional effect of protagonist's attitude toward AI on identification at levels of participant's prior beliefs about AI. PROCESS (model 1)

7.3. Hypothesis 2: identification as a mediating mechanism

To test this the second hypothesis, the PROCESS macro for *SPSS* was used (model 7, using 10,000 bootstrapping samples to generate 95% confidence intervals by the percentile method). This procedure allows an estimation of the (conditional) indirect effects of the attitude of the protagonist of the message toward AI on the two dependent variables considered through identification as a mediating variable, at the different levels of the moderating variable (prior beliefs of the participants about AI).

The results of this analysis revealed that the index of moderated mediation (IMM) was statistically different from 0 (IMM = .20, *SE* = .07, 95% *CI* [.05, .35]), suggesting a positive linear relationship between prior beliefs about AI and the indirect effect of the narrative message on the attitude toward AI through identification. Moreover, it was observed that identification with the protagonist was associated with a more positive attitude toward AI (B = .61, *SE* = .03, p < .001). Finally, it was observed that the (conditional) indirect effect was only different from 0 (statistically significant) among people with positive prior beliefs about LA (*effect* = .17, *SE* = .06, 95% *CI* [.05, .29]) (see Table 1). This provides empirical support for H2a.

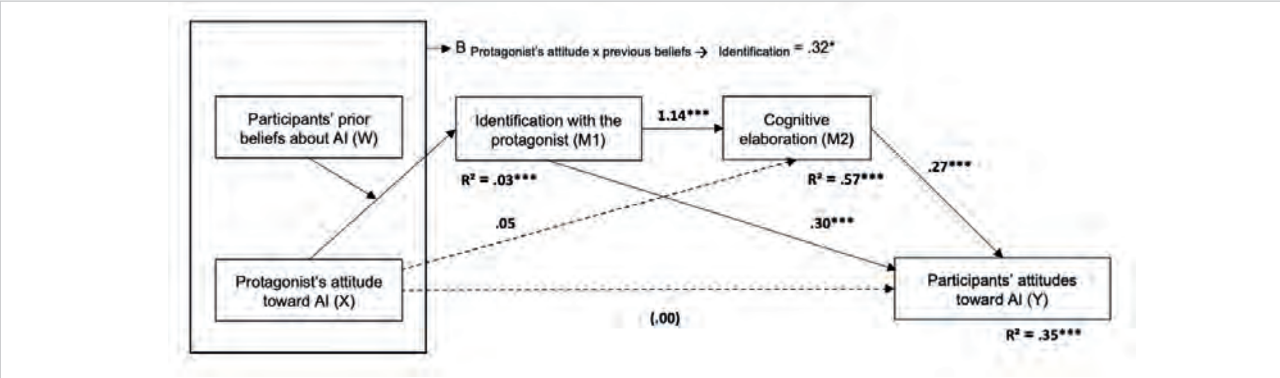
Similar results were obtained regarding the intention to use IA. The index of moderated mediation was statistically different from 0 (IMM = .25, *SE* = .09, 95% *CI* [.06, .45]), suggesting a positive linear relationship between prior beliefs about AI and the indirect effect of the narrative message on the intention to use AI through identification. Identification with the protagonist was associated with greater intention to use AI (B = .78, *SE* = .04, p < .001). Furthermore, the (conditional) indirect effect was only different from 0 (statistically significant) among people with positive prior beliefs about IA (*effect* = .21, *SE* = .07, 95% *CI* [.06, .37]) (see Table 1). This provides empirical support for H2b, too.

Table 1. Conditional indirect effects of protagonist's attitude toward AI on participants' attitude toward (H2a) and intention to use AI (H2b) through identification. Moderated mediation models with PROCESS (model 7)

Conditional indirect effects	***Effect***	***Boot SE***	***Boot 95% CI***
Protagonist's attitude toward AI → Identification → Attitude toward AI			
– Negative beliefs about AI (3.55)	-.0527	.0632	[-.1778, .0732]
– Ambivalent beliefs about AI (4.00)	.0366	.0460	[-.0540, .1260]
– Positive beliefs about AI (4.66)	**.1704**	**.0610**	**[.0515, .2944]**
IMM = .2008 (95% CI: .0515, .3552)			
Protagonist's attitude toward AI → Identification → Intention to use AI			
– Negative beliefs about AI (3.55)	-.0675	.0809	[-.2267, .0940]
– Ambivalent beliefs about AI (4.00)	.0469	.0588	[-.0701, .1610]
– Positive beliefs about AI (4.66)	**.2185**	**.0780**	**[.0670, .3756]**
IMM = .2575 (95% CI: .0659, .4582)			

Note. The table shows the conditional indirect effects. We used 95% percentile bootstrap confidence intervals based on 10,000 bootstrap samples for statistical inference of the conditional indirect effects. An indirect effect is considered to be statistically significant if the established confidence interval (95% CI) does not include the value 0. If the value 0 is included in the confidence interval, the indirect effect is equal to 0, that is, there is no association between the variables involved (**Hayes**, 2022). Significant indirect effects in bold. Protagonist's attitude toward AI: –0.5 = negative, 0.5 = positive. Quantitative moderating variable (W): participant's prior beliefs about AI (1 = very negative, 7 = very positive). W values are the 16th, 50th, and 84th percentiles. IMM = index of moderated mediation.

(a) Dependent variable: *attitude toward AI* (H3a)



(b) Dependent variable: *intention to use AI* (H3b)

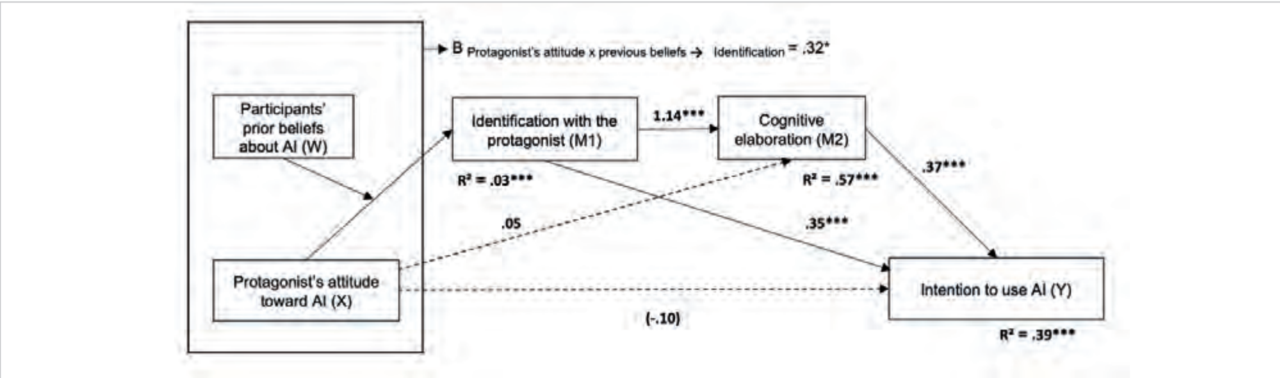


Figure 3. Results of the moderated serial multiple mediation analysis (H3). PROCESS (model 83)
Note. The figures show the unstandardized regression coefficients, B. The coefficients of the direct effects appear in parentheses. Dashed lines represent nonsignificant coefficients. *** $p < .001$.

7.4. Hypothesis 3: identification and cognitive elaboration as mediators

To test the third hypothesis, the PROCESS macro for *SPSS* was used (model 83, using 10,000 bootstrapping samples to generate 95% confidence intervals by the percentile method). This procedure enables an estimation of the (conditional) indirect effects of the attitude of the protagonist of the narrative message on the dependent variables through identification (as a primary mediator) and cognitive elaboration (as a secondary mediator), at the different levels of the moderating variable (prior beliefs about AI).

Identification was found to be associated with greater cognitive elaboration (*B* = 1.14, *SE* = .03, $p < .001$). In addition, cognitive elaboration was significantly associated with a more favorable attitude toward AI (*B* = .27, *SE* = .03, $p < .001$; see Figure 3a) and greater intention to use AI (*B* = .37, *SE* = .04, $p < .001$; see Figure 3b).

Two statistically significant conditional indirect effects of the attitude of the protagonist of the message toward AI were observed on both dependent variables, although only among people with previous positive beliefs about AI (see Table 2): through identification (attitudes toward AI: *effect* = .08, *SE* = .03, 95% *CI* [.02, .16]; intention to use AI: *effect* = .09, *SE* = .04, 95% *CI* [.02, .19]) and through the serial mediation of identification and cognitive elaboration (attitude toward AI: *effect* = .08, *SE* = .03, 95% *CI* [.02, .16]; intention to use AI: *effect* = .11, *SE* = .04, 95% *CI* [.03, .22]). However, cognitive elaboration did not act, by itself (see the nonconditional indirect effect in Table 2), as a significant mediator. On the other hand, the predictive model of the attitude toward AI including cognitive elaboration (controlling for the effect of identification) explained 35.77% of the variance ($p < .001$), while the model that did not include elaboration but only identification explained 30.11% of the variance ($p < .001$). Likewise, the predictive model of the intention to use AI with the inclusion of cognitive elaboration (controlling for the effect of identification) explained 39.95% of the variance ($p < .001$), while the model that only included identification explained 32.78% of the variance ($p < .001$). Empirical support is therefore found for H3, and it can be concluded that identification and cognitive elaboration are relevant mediating mechanisms that act in tandem.

> By activating certain *cues* in the narrative message about the attitude manifested by its protagonist, greater identification can be induced as long as there is attitudinal matching

Table 2. Conditional and unconditional indirect effects of protagonist's attitude toward AI on participants' attitude toward (H3a) and intention to use AI (H3b) through identification and cognitive elaboration. Moderated serial multiple mediation model with PROCESS (model 83)

(a) Dependent variable: *attitude toward AI* (H3a)

Conditional and unconditional indirect effects	***Effect***	***Boot SE***	***Boot 95% CI***
Protagonist's attitude toward AI → Identification → Attitudes toward AI			
– Negative beliefs about AI (3.55)	-.0261	.0319	[-.0912 .0374]
– Ambivalent beliefs about AI (4.00)	.0181	.0237	[-.0259, .0682]
– Positive beliefs about AI (4.66)	**.0845**	**.0369**	**[.0213, .1649]**
IMM = .0996 (95% CI: .0223, .1946)			
Protagonist's attitude toward AI → Cognitive elaboration → Attitudes toward AI	.0136	.0201	[-.0267, .0537]
Protagonist's attitude toward AI → Identification → Cognitive elaboration → Attitu-des toward AI			
– Negative beliefs about AI (3.55)	-.0266	.0340	[-.0995, .0361]
– Ambivalent beliefs about AI (4.00)	.0184	.0240	[-.0291, .0675]
– Positive beliefs about AI (4.66)	**.0859**	**.0362**	**[.0245, .1667]**
IMM = .1012 (95% CI: .0235, .2061)			

(b) Dependent variable: *intention to use AI* (H3b)

Conditional and unconditional indirect effects	***Effect***	***Boot SE***	***Boot 95% CI***
Protagonist's attitude toward AI → Identification → Intention to use AI			
– Negative beliefs about AI (3.55)	-.0308	.0374	[-.1069, .0430]
– Ambivalent beliefs about AI (4.00)	.0214	.0279	[-.0305, .0806]
– Positive beliefs about AI (4.66)	**.0997**	**.0431**	**[.0262, .1926]**
IMM = .1175 (95% CI: .0266, .2311)			
Protagonist's attitude toward AI → Cognitive elaboration → Intention to use AI	.0188	.0274	[-.0367, .0722]
Protagonist's attitude toward AI → Identification → Cognitive elaboration → Inten-tion to use AI			
– Negative beliefs about AI (3.55)	-.0367	.0461	[-.1342, .0496]
– Ambivalent beliefs about AI (4.00)	.0255	.0327	[-.0400, .0906]
– Positive beliefs about AI (4.66)	**.1188**	**.0470**	**[.0349, .2216]**
IMM = .1400 (95% CI: .0345, .2704)			

Note. The table shows the conditional and unconditional indirect effects. We used 95% percentile bootstrap confidence intervals based on 10,000 bootstrap samples for statistical inference of the conditional indirect effects. An indirect effect is considered to be statistically significant if the established confidence interval (95% CI) does not include the value 0. If the value 0 is included in the confidence interval, the indirect effect is equal to 0, that is, there is no association between the variables involved (**Hayes**, 2022). Significant indirect effects in bold. Protagonist's attitude toward AI: –0.5 = negative, 0.5 = positive. Quantitative moderating variable (W): participants' prior beliefs about AI (1 = very negative, 7 = very positive). W values are the 16th, 50th, and 84th percentiles. IMM = index of moderated mediation.

8. Discussion and conclusions

In research on narrative persuasion using personal or testimonial messages, works focused on health promotion are particularly prominent (e.g., **Chen**; **Bell**; **Taylor**, 2017; **De-Graaf**; **Sanders**; **Hoeken**, 2016; **Igartua**; **Rodríguez-Contreras**, 2020). However, little work has been carried out on narrative persuasion strategies to improve the social perception of data science and AI. The current study makes a significant contribution to the study of narrative persuasion processes applied to this topic. It is based on previous research on identification as a key element of narrative persuasion processes (**Tal-Or**; **Cohen**, 2015), which fundamentally address two major, complementary aspects. In the first place, our work is founded on previous research on the analysis of the intrinsic characteristics of narrative messages that can trigger identification with the protagonist (**Tukachinsky**, 2014). Secondly, we rely on previous work on the psychological processes responsible for the persuasive impact of narrative messages (**Bilandzic**; **Busselle**, 2013).

This study makes a significant contribution regarding the first aspect in finding that attitudinal similarity has a significant impact on identification. The current results show that a message whose protagonist expresses a positive attitude toward AI induced greater identification only in those participants with positive prior beliefs about AI. Besides, it was also observed that the message delivered by a protagonist who expressed an ambivalent attitude toward AI induced greater identification only among participants with negative prior beliefs about AI. In this context, the concept of similarity between the audience and protagonist of a message as applied in this research goes beyond the classical dimensions used in previous studies that define similarity based on sociodemographic criteria (e.g., gender, age, or group ethnicity), which have found null effects of objective similarity on identification (**Cohen**; **Weimann-Saks**; **Mazor-Tregerman**, 2018; **Hoeken**; **Kolthoff**; **Sanders**, 2016; **Ooms** *et al.*, 2019; **Tukachinsky**, 2014).

It is suggested that similarity based on psychological aspects (in this case, beliefs and attitudes manifested by the protagonist of a first-person testimonial message) can facilitate the establishment of affective and cognitive bonds. By activating certain cues in the narrative message about the attitude manifested by its protagonist toward the attitudinal object (in our case, reporting positive experiences about the use of AI), greater identification can be induced as long as there is attitudinal matching (in this case, that the person receiving the message also manifests positive prior beliefs about AI). This approach derives from the theories of social identity and self-categorization (**Tajfel**, 1982; **Turner**, 1985), which suggest that people tend to categorize those they perceive to be similar as members of the ingroup (where the protagonist shows an attitude similar to that of the audience) but those they perceive to be different as members of the outgroup (where the protagonist shows an attitude discordant with that of the audience). This leads to different reactions toward the members of the ingroup versus outgroup, in our case manifested as greater identification with the protagonist from the ingroup compared with the outgroup, since they expressed attitudes and beliefs similar to those of the audience. The current results confirm that this argument is correct, since the experimental manipulation of attitudinal similarity had a significant impact on identification that was moreover independent of the demographic similarity (in terms of gender and age) between the participants and the protagonist of the message.

Identification and cognitive elaboration could act as mediating mechanisms acting in tandem, since identification constitutes a process of *temporary involvement* with the message and can therefore in turn activate deep or systematic cognitive processing in people

Second, this research also makes a significant contribution by identifying and explaining the psychological mechanisms responsible for the persuasive impact of narrative messages. The present work establishes that identification and cognitive elaboration could act as mediating mechanisms acting in tandem, since identification constitutes a process of *temporary involvement* with the message and can therefore in turn activate deep or systematic cognitive processing in people, such that they question their prior opinions and *adjust* their attitudes about the attitudinal object on which the narrative message centers (in this case, AI). Thus, our work thereby contributes to the consolidation of a line of theoretical reflection on the relationship between identification and cognitive elaboration that is in accordance with results obtained in previous studies on other attitudinal objects such as health promotion (e.g., **De-Graaf**; **Van-Leeuwen**, 2017; **Igartua**; **Vega**, 2016).

The most important limitation of this study is that the proposed mediators were measured rather than being manipulated experimentally, which prevents firm conclusions regarding the proposed causal sequence (identification → cognitive elaboration). This problem is present in other studies that test mediational models in this field (e.g., **Dale**; **Moyer-Gusé**, 2020). Although temporal precedence is an important element to establish causal inference, it is also necessary to propose a theoretical argument regarding the relationship between the mediating mechanisms, which is achieved herein by relying on predictions derived from previous research on narrative persuasion. Indeed, future research should use other methodological approaches to deal with such problems of causal inference (**Pirlott**; **MacKinnon**, 2016).

A second limitation of the present research is that the narrative messages used in the experiment were only related to the use of AI in the bureaucratic/health field, with the added component of the recent COVID-19 pandemic. So, it is clear that testimonial narratives alluding to other topics, such as the application of AI in leisure or work environments, or the economy, are required to confirm that the results obtained can be replicated in other areas related to AI.

In conclusion, this work makes a significant contribution to the study of narrative persuasion processes using testimonial messages. Our work provides significant findings on the effect of attitudinal similarity on identification with the protagonist and also advances knowledge regarding the relationship between this process, cognitive elaboration, and attitudinal impact in a field of study (improving social perceptions of AI) that has not yet been explored in research on narrative persuasion. Overall, this could help to improve science communication in general as well as the design of interventions and media campaigns in a narrative format.

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Educational influence of knowledge of the masked presence of alcohol on *Instagram* on behavior change

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Abstract

The push strategy of anti-alcohol campaigns targeting young people, both in traditional media and on social media, has shown a limited capacity to contribute to the development of healthy behaviors. Even when young people know about the harmful effects of alcohol, they develop reactance attitudes, self-affirmation reactions, defensive responses, and neutralization of the persuasive attempts of institutional messages. It is necessary to seek new educational communication strategies that are effective in modifying behaviors favorable to alcohol consumption among young people. The aim of this research is to implement an educational method that favors this change toward healthy behaviors. On the basis of the *Instagram* campaign "Like my addiction," 124 young people (age: M = 23.6 years, SD = 2.8 years) participated for 3 weeks in three phases to test whether the presence of alcohol on *Instagram* had an impact on their beliefs, attitudes, and behaviors, as well as the effectiveness of the educational method tested. Half of the subjects followed a process of becoming aware of the presence of alcohol in this *Instagram* campaign and then participated in an interactive process of discussion according to the critical–dialogical educational method. The results show that this educational method is effective. Subjects in the control group who did not follow the method did not modify their behavior on *Instagram*. In contrast, the experimental group became aware of the masked presence of alcohol on *Instagram*. These subjects exhibit self-persuasion that makes them modify their activity favorably between the pre-test and post-test phase as they change their attitudes and behaviors toward alcohol. The results show that the critical–dialogical formative method can be favorably applied to implement campaigns and educational actions to fight alcohol addiction among young people.

Keywords

Media psychology; Alcohol; Alcoholism; Health education practice; Social media; *Instagram*; Masking; Critical dialogical method; Pull advertising.

1. Introduction

Excessive alcohol consumption among young people has been repeatedly highlighted as a problem, with repercussions on physical, mental, and social health. Various scientific publications specializing in the study of alcoholism (e.g., *Alcoholism: Clinical and experimental research*; *Alcohol research: Current reviews*; *Alcohol and alcoholism*; *Journal of studies on alcohol and drugs*; *Drug and alcohol dependence*) have highlighted these pernicious effects. In general, these studies, mainly from biomedical and psychosocial perspectives, have focused their efforts on understanding the phenomenon's prevalence, investigating the psychophysical disorders derived from consumption, possible pharmacological and psychological treatments, or public health policies. However, hardly any studies have been carried out from a communicative or educational perspective to seek to attenuate and modify behaviors in relation to some of the factors that contribute to and favor alcohol consumption. From the latter perspective, institutions have resorted to push strategies through anti-alcohol advertising campaigns for several decades in an attempt to counteract the effects of excessive alcohol consumption among young people. These show, for example, the pernicious effects of alcohol through negative emotional appeals (**Antonetti**; **Baines**; **Walker**, 2015; **Lee**, 2017; **Dunstone** *et al*., 2017) and call for individual responsibility or present social models (**Alhabash** *et al*., 2020). These campaigns, although embedded in traditional media (Image 1), have been ineffective in changing young people's behaviors, as they took place in a context of distrust toward advertising among young people, described in the literature as strategies to resist advertising (**Fransen** *et al*., 2015), defensive responses (**Brown**; **Locker**, 2009; **Van't-Riet**; **Ruiter**, 2013), reactance attitudes (**Stanojlovic**, 2015), self-affirmation reactions (**Knight**; **Norman**, 2016), and explicit neutralization and counter-arguing by young people after becoming aware of such explicit persuasive attempts by health authorities (**Piacentini**; **Chatzidakis**; **Banister**, 2012, **Banister**; **Piacentini**; **Grimes**, 2019). Likewise, the transfer of this type of push advertising to the Internet and social media also produces rejection among young people (**De-Frutos-Torres**; **Pastor-Rodríguez**; **Martín-García**, 2021). Systematic reviews of the effectiveness of such anti-alcohol media campaigns yield heterogeneous results (**Yadav**; **Yobayashi**, 2015) and conclude that, even when they produce cognitive and emotional effects, there is little evidence that they reduce alcohol consumption or promote beneficial behavioral changes (**Janssen** *et al*., 2013; **Young** *et al*., 2018; **Stanojlovic** *et al*., 2020; **Henehan** *et al*., 2020). In addition, alcohol is also present in a masked form on social media, e.g., in enjoyment and entertainment content that appeals to young people (**Barry** *et al*., 2016; 2018a; 2018b; **Zerhouni**; **Bègue**; **O'Brien**, 2019). In this new context, it is necessary first to investigate the effect that this type of trivialized presence of alcohol on social media has on young people and second to seek alternative strategies other than the traditional alcoholism prevention campaigns to contribute to a reduction in unfavorable behaviors regarding alcohol tolerance. We must think about and implement new approaches and strategies to prevent alcoholism and promote healthy behaviors, adapted to new forms of institutional and socioeducational communication with young people.

Image 1. Example of an institutional anti-alcohol push campaign. Source: *Ministry of Health and Consumer Affairs* of Spain. *https://www.sanidad.gob.es/ca/campannas/campanas06/img/Cartel2.jpg*

The present study is framed from a communicational and educational perspective to answer the aforementioned general objectives. The theoretical foundation of the research is critical–dialogical theory (**Bermejo-Berros**, 2021). This theory uses a critical–dialogical method in the context of interactions with a sociocultural nature (**Wertsch**, 1993; **Rogoff**, 1990; 2003), in which the educator promotes media competence and addresses young people's critical attitudes according to the theories of such activity (**Leontiev**, 1978; **Engeström**, 2014). An approach based on successive steps (**Gal'perin**, 1969; **Talizina**, 1988; **Solovieva**; **Quintanar**, 2020) is also employed, using a formative process that starts from the periphery of knowledge (the *what*) then continues to the center (the *how*, *why*, and *what for*) (**Piaget**, 1985), resulting in a progressive improvement in the understanding and expression of the five structures that make up narrative thinking (**Bermejo-Berros**, 2005; 2021). The critical–dialogical method includes the interweaving of four dimensions:

a) the competences of the subject activated/fostered in the activity;

b) a concrete media product;

c) a critical–dialogical sociocultural activity promoted and channeled by the educator in successive steps, and (d) collective participation of the group members (**Bermejo-Berros**, 2021, p. 113).

The critical–dialogical theory has proved to be effective and useful in fostering the acquisition of critical attitudes and media competence. Therefore, this theory is helpful in addressing the two general objectives pursued in this research, and will not only allow for the comprehension of the effects induced by the masked presence of alcohol on social media, but will also be used as a training strategy to contribute to both a critical awareness of alcohol and a positive behavioral change in the use of these media that utilize scenes including alcohol.

To implement the critical–dialogical educational activity, we selected the campaign "Like my addiction," created by *Addict Aide* (2021), an organization that tries to raise awareness among young people regarding alcoholism. The *BETC* agency (Paris) created a social media campaign with the aim of showing how easy it is to miss the signs of addiction. In this campaign, Louise Delage, a 25-year-old Parisian, created a profile on *Instagram*. Her photos had simple captions, such as "Relaxing with friends" or "Dancing," or sometimes just an emoji. *Instagram* users viewing the profile were


Image 2. One of Louise Delage's photos on her *Instagram* account

unaware that it was a campaign. Just 1 month later, Louise had amassed 65,000 followers and her photos had received 50,000 likes. However, in the final post, it was revealed that the account was fake, with the purpose of showing "a person who people are familiar with on a daily basis but would never suspect of being an addict." In each of her 150 posts, Delage appeared with alcohol (Image 2). The aim of the campaign was to try to serve as a "reveal" to help people struggling with addiction, and the *BETC* campaign was successful in that it received a massive response on *Instagram*. However, it is not known whether the campaign influenced people to reduce alcohol consumption and/or addiction. Nevertheless, this campaign is interesting in that it suggests a pull strategy as an alternative to traditional, push campaigns (**Bermejo-Berros**, 2020).

Within the framework of the two general objectives mentioned above, we focused on the content of this campaign to investigate various questions of interest through empirical research. The first specific objective is to investigate the effects of this campaign, namely to understand how the acceptance response on *Instagram* can be explained, and more importantly, the subsequent psychological influence of the campaign. The photos show the young instagrammer in the foreground in scenarios of enjoyment and reverie, with alcohol present in all of them, and even being consumed in some of them. Although it is not known whether the presence of alcohol in this campaign goes unnoticed or, on the contrary, produces pernicious effects, it is possible that alcohol is associated with the enjoyment of a situation. There is a masking effect of alcohol in the scene surrounding the young Louise, who is the central focus of attention. The question is whether the presence of alcohol is only a secondary element in the scene or whether it is fused with the hedonistic enjoyment that the setting represents. These questions are integrated in our first RQ and hypothesis:

RQ1. What influence does Delage's profile have on young instagrammers in terms of their perception of the photos, their attitudes and intention to engage in response actions on Instagram, and their processing of the presence of alcohol on this *Instagram* profile?

H1. The presence of alcohol in Louise Delage's campaign photos is not perceived or does not invoke rejection. This is manifested in:

H1a. Subjects do not perceive the presence of alcohol in the photos.

H1b. When subjects perceive the presence of alcohol in the photos, they do not counter-argue against that presence bur rather focus on describing the pleasurable themes suggested by the photos.

H1c. Attitudes toward the photos are favorable, and there is no rejection behavior toward their use on *Instagram*.

While H1 inquires about the subject's response to Delage's profile, a second issue that arises is in regard to the subject's beliefs when informed of the explicit presence of alcohol in the profile pictures and whether those beliefs influence their behavior. Specifically, we consider RQ2 and H2:

RQ2. What are the subjects' opinions and beliefs about the final influence of alcohol in campaigns such as Delage's on their own perceptions or behaviors? How do these beliefs influence behavior towards alcohol?

H2. Beliefs about the role of alcohol presence in the *Instagram* campaign influence the subject's behavior on *Instagram*.

Finally, as mentioned above, it is necessary to test methods that allow progress to be made in the search for effective ways of combating alcohol addiction. It is no longer a matter of using coercive methods that induce fear or appealed to responsibility, as was done in the past with unsuccessful results, but of seeking pull strategies that lead young people to voluntarily modify their behaviors in relation to alcohol in the communication environments in which they live and are active (**Bermejo-Berros**, 2022). Research in genetic epistemology has shown that awareness of a behavior or habit can have the effect of reconstruction and positive modification of that behavior (**Piaget**, 1985; 2015). According to genetic epistemology, one way for the subject to achieve an awareness that leads them to modify their actions is to present them with a contradiction (**Piaget**, 1980, 2006). Taking this theoretical framework as a reference, which is integrated into the critical–dialogical theory presented above, a second specific objective that implements a methodology with two dimensions is proposed herein. The first dimension investigates how the subject is emotionally impacted by knowing the campaign's four characteristics: (1) verifying the presence of alcohol in all the photos, (2) discovering that Louise Delage is an alcoholic, (3) noticing that the *Instagram* account was fake and that this young woman was an actress, and (4) learning that the account had been created by Addict Aide to raise awareness about the problem of alcohol use among young people. The second dimension, utilizing the critical–dialogical method, seeks information about the subsequent group discussion, i.e., whether dialog about the characteristics of the campaign can influence the participants' behavior on *Instagram*, thus promoting alcoholism prevention behaviors. It is postulated that young people are not aware of the campaign's four characteristics, so this awareness and discussion could present them with a contradiction and thereby improve their behavior. Specifically, the following research question and hypothesis are posed:

> Alcohol is quite present in social media and often goes unnoticed

RQ3. Can awareness of and reflection on this particular fake account lead to a modification of attitudes and behavior that would be beneficial for the prevention of alcoholism?

H3. Awareness and group discussion about the campaign's four features influence medium-term subject behavior change on *Instagram*, with the benefit of reducing behavior related to alcohol exposure.

2. Method

2.1. Participants and Procedure

Participants were selected in accordance with Louise Delage's age profile. University students of both sexes participated voluntarily in the research, carried out in the *LipsiMedia* laboratory of the *University of Valladolid*. Of the 146 initial participants, 22 were excluded, either because they did not complete one of the phases or because they did not send the data requested in phases 1 and 3. A total of 124 young people (71 women and 53 men) between 19 and 25 years old (M = 23.6 years, SD = 2.8 years) completed the three phases of the research. To participate in the research, it was necessary for the participant to have an active *Instagram* account, as well as to be unaware of the "Like my addiction" campaign, as verified in Phase 2 of the research (*Addict Aide*, 2021; **Hunt**, 2016). Data collection was carried out in accordance with the ethical principles of research, guaranteeing confidentiality and with informed consent from the participants. The activities, factors, and variables included in the research are summarized in Table 1 and specified in the three phases listed below:

Phase 1 (pre-test)

In the first session, subjects came to the laboratory and were informed about how they could obtain a backup copy of their *Instagram* activity data for 1 week. They were also informed of the data that they had to send to the researcher by email. To ensure privacy and security, they were informed that these data do not correspond to content but rather to numerical data, which would be kept private at all times. As specified in the following section, to complete the *Instagram behavioral index* (*Ibehi*), they had to send the total figures of their metrics included in the *Instagram* backup corresponding to the week prior to Phase 2 to the researcher.

Phase 2 (experimental)

A week later, a face-to-face session took place in the laboratory room. The first part of the session aimed to test H1. On a computer screen, the subject viewed a selection of 12 photos from Louise Delage's *Instagram* account (Annex). The subject then answered the first questionnaire on the computer, with questions appearing successively on the screen as the subject completed the questionnaire. The first factor that this questionnaire investigated was the degree to which the subjects perceived the presence of alcohol in the 12 photos, their reactions to the photos, and how they processed these reactions. The questions posed, using different scales, sought to collect information on four variables: (1) the description of the THEMES and content perceived in the photos, (2) the ATTITUDES toward the photos, (3) their RESPONSE BEHAVIORS on *Instagram*, and (4) the perception of the PRESENCE of alcohol.

Then, in the second part of the session, the participant completed a second questionnaire aimed at testing H2. Previously, the subjects were randomly divided into two groups: INF (informed) and UNINF (uninformed). The difference between them is that the INF experimental group was provided with all the information about the objectives of the "Like my addiction" campaign. They were made aware of the campaign's four characteristics, and in addition, a group discussion following the critical–dialogical method was carried out regarding what that information meant to them, the meaning of likes on *Instagram*, and opinions about the campaign and its possible effects. In contrast, the UNINF control group was limited to viewing and commenting on *Instagram* images for an equivalent period. The second questionnaire investigated two other factors. The first was emotional impact (variable IMPACT), which corresponded, in this research, to the attitudinal reaction experienced by INF participants after being told that the supposedly true profile of Delage was fake. They became aware of the four characteristics of the anti-alcohol campaign behind the misleading profile. The evaluation of the reaction to each of these characteristics is measured using the questionnaire's four IMPACT scales included in Annex, whose items inquire about the emotional reaction to being informed regarding each of the campaign's four characteristics. These characteristics, along with some examples, are described in Sect. 3.3 (Influence of becoming aware of alcoholism).

The third factor included four scales whose items analyzed two types of beliefs.

- The first belief type (variable CULTIVATION) concerns beliefs regarding the supposed influence on one's attitudes, values, and behaviors as a consequence of interacting with social networks, as was the case with the followers of Louise Delage's profile. Thus, this first belief type inquires about participants' representations concerning the campaign's ability to cultivate first-level beliefs, particularly its influence on the trivialization of the consumption of alcohol. The notion of cultivation is understood in the sense put forward in the current Cultivation Theory (**Morgan**; **Shanahan**; **Signorielli**, 2015) and its exploration in terms of *Instagram* (**Stein**; **Krause**; **Ohler**, 2021).

- The second belief type (variable KNOWLEDGE) concerns beliefs regarding the supposed influence of this type of alcoholism awareness campaign on young people's behavior. As illustrated by the "Like my addiction" campaign, the aim was for the young person to become aware of the profile's falsehood and, consequently, of the false interaction with the person on *Instagram*. In short, this third factor analyzed whether knowing the four characteristics of this campaign against alcohol could influence beliefs about its effectiveness in changing behaviors on *Instagram*.

All the items of all the scales and variables included in the questionnaires (Annex) can be consulted on:
https://uvadoc.uva.es/handle/10324/52682

Likewise, an online version of the questionnaire completion process can be consulted on:
https://www.encuestafacil.com/respweb/cuestionarios.aspx?EID=2724126

Finally, in the third and final part of the session, there was a group discussion for the INF group (according to the critical–dialogical method) regarding the information received about the campaign during the second part of the session. Meanwhile, for a period of time equivalent to the INF group's group discussion (40 minutes), the UNINF group viewed *Instagram* photos and their respective comments, and had a group conversation about photography in general. During these activities, the subjects in the UNINF control group were not informed of the characteristics of the Delage campaign. To end the session, participants were simply informed that they would be contacted by mail one week later.

Phase 3 (post-test)

One week after Phase 2, the researcher asked subjects, just as they did in Phase 1, to download *Instagram* activity data from the week following Phase 2 and email it to the researcher, in order to test H3. The comparison of their behavior metrics on *Instagram* before and after Phase 2 showed whether the participant maintained the same activity on *Instagram*, or if there was an increase or decrease. The participant was informed of this comparison's results and asked to evaluate and comment on it to better understand their activity at the end of the experiment.

Table 1. Research phases, activities, factors, and variables

Phase	Groups	Activities	Factors	Variables
Phase 1 (pre-test)	INF (informed) and UNINF (uninformed)	*Instagram* activity metrics week 1	*Instagram* Behavioral Index (week 1)	Activity data from *Instagram* during week 1
Phase 2 (session in laboratory)	INF and UNINF	* Exposure to 12 photos from Louise Delage's *Instagram* account * Questionnaire 1 (H1)	**Factor 1** (perception of and reaction to the presence of alcohol in photos)	1. Description of the THEMES and contents perceived in the photos 2. ATTITUDES towards the photos 3. RESPONSE BEHAVIORS on *Instagram* 4. Perception of the PRESENCE of alcohol
	INF	* Information on the objectives of the "Like my addiction" campaign * Questionnaire 2 (H2) * Critical–dialogical training session on campaign (H3)	**Factor 2** (emotional impact)	5. Four scales of emotional IMPACT when knowing campaign characteristics
			Factor 3 (beliefs)	6. CULTIVATION of first-level beliefs 7. KNOWLEDGE (influence on behavior)
	UNINF	* Viewing and commenting on *Instagram* photos * Questionnaire 2 (H2) * *Instagram* photo discussion session (H3)		
Phase 3 (post-test)	INF and UNINF	*Instagram* activity metrics week 2	*Instagram behavioral index* (week 2)	Activity data from *Instagram* during week 3

2.2. Dependent variables

The two questionnaires used in Phase 2 collected information on the first two factors (perception of and reaction to the presence of alcohol in photos, beliefs, and impact) whose seven variables were mentioned above (THEME, ATTITUDES, BEHAVIOR, PRESENCE, IMPACT, CULTIVATION, and KNOWLEDGE). With respect to the third factor (CULTIVATION and AWARENESS variables), to understand the subsequent influence that the awareness of the "Like my addiction" campaign had during the research, the *Ibehi* was created. This index measures the *Instagram* activity resulting from participation in this experiment, being obtained as follows: Data included from the three weekly *Instagram* backups from the three datasets were utilized. The numerical data of the five folders provided by the *Instagram* backup Profile [photos or videos published on the profile]; Direct [images, multimedia files, and audios sent or received]; Stories; Photos; and Videos). In addition, the number of three types of JSON files was also considered: comments (participant's comments on *Instagram*), likes (photos and videos that the participant "liked"), and messages (sent and received via *Instagram* direct messaging). One point was attributed to each of the activities performed in any of these eight variables. To calculate the *Ibehi* for Phase 1 (pre-test), the total number of points from the eight variables during the week analyzed was summed. To calculate the *Ibehi* for Phase 3 (post-test), the same procedure was followed, taking the average by type of the two post-test weeks. Next, the percentage difference between the *Ibehi* for the pre-test and post-test phases was calculated. This gave a percentage increase or decrease in *Instagram* activity between Phase 1 (pre-test) and Phase 3 (post-test). These typified data are referred to as the *Instagram behavioral index* (*Ibehi*).

> The trivialization of alcohol in social media influences the pro-alcohol behavior of young people

3. Results

3.1. Influence of alcohol on campaign reception

The first observation pertains to the description of the photos (THEMES), with 74.2% of the subjects explicitly mentioning the presence of alcohol. A significant fraction of the responses suggest that the participants related the photos with desirable positive perceptions, such as hedonism [(enjoyment, pleasure, and fun; 52.9%), tranquility (23.7%), and idyllic life (9.6%)] and the suggestibility of the influencers (7.1%). Only 6.7% of the responses alluded to the association between alcohol and addiction.

Secondly, the questionnaire includes several specific questions regarding the perception of alcohol in the context favorably described by the subjects. When asked whether there was anything striking in the photos, half of the subjects said no (56.5%) while the other half alluded to the presence of alcohol, but without negative connotations (43.5%). A total of 79.2% said that there was alcohol in the photos, although only 29.2% said that there was alcohol in all the photos, as was the case (in one or two photos 12.5%, in three or four 16.7%, in almost all 37.5%). Therefore, these results indicate that there is an association between alcohol and enjoyment, as in traditional advertising. The subjects perceived the presence of alcohol, but this neither worried them nor constituted a disturbance of the context represented in the photo, so it can be considered to be an indirect indicator of the normalization of alcohol in the lives of young people.

Finally, the next result regarding the variable ATTITUDES (AT) clearly showed that the photos were perceived as relating to enjoyment: 59.2% of the subjects liked the photos quite a lot or very much (five-point scale: $M = 4.59$, $SD = 0.89$), whereas only 7.4% did not like them at all or very little (Annex: AT.3). Regarding the possible response actions on *Instagram* (AT.2–5), 48.1% of the subjects would give a like to all or almost all of the photos, while 66.6% would give a like to half or more of them. Only 11.1% would not give a like to any of the photos (AT.4). Among the reasons that the subjects expressed for giving a like to the photos were the justification for esthetics (74.1%) and because they inspired something positive, such as peace or freedom (7.4%). A total of 14.8% of the subjects stated that they would not give a like to the photos because they were not interested in the content, either because they did not know the person or because they did not share similar values. Only 3.7% of the subjects justified not giving a like to the photos because they considered some of the photos to encourage drinking (AT.5). Most of the subjects would not comment on the photos (74.2%), 9.7% would comment on some of them, while only 3.2% would comment on half (AT.6). As a justification for these answers, a significant part of the subjects affirmed that they do not usually post comments on *Instagram* (59.3%) or that they do not post comments on the profiles of people they do not know or are not interested in (29.6% + 3.7%). The small percentage of subjects who would post comments said they would do so if the photos were striking (3.5%) or depending on the moment (3.4%) (AT.7). In line with these findings, the majority of the subjects would not share these photos on *Instagram* (63%), or would share only some of them (33.3%), whereas only 4.1% would share almost all of the photos (AT.8). The response categories chosen to justify not sharing photos highlight that either that they do not usually share photos of other people (34.3%), that they share them with friends because they attract their attention (25.9%), or because they never share photos (19.2%). A total of 15.4% of the subjects would not share these photos because they consider them to be of low quality and interest, while only 3.8% would not share them because of the appearance of alcohol (AT.9). Finally, in line with the previous results, a large number of the subjects would keep none (63%) or only some of the photos (22.2%). Only 7.4% would keep half of them, while another 7.5% would keep almost all of them (AT.10). Participants stated that they would not keep these photos because it is not content they personally relate to (40.7%). Another 14.8% do not usually keep photos, and 11.1% do not usually keep photos of other people. Regarding the reasons for keeping photos, 22.2% would keep them as an example of inspiration, while 11.3% would keep them for esthetic reasons (AT.11).

Thus, these photos were largely well liked. Regarding the response actions, the presence of alcohol did not appear as a rejection criterion for not liking, commenting on, sharing, or keeping the photos. The criteria for acceptance or rejection that led to some of these actions were based on two main arguments. One has to do with personal closeness, i.e., the subject does not usually comment, share, or keep photos of other people. This is, therefore, an interpersonal communication relationship. The other argument relies on an esthetic criterion for both the acceptance and rejection of a photo.

In conclusion, the analysis of the themes and attitudes leads to the confirmation of H1. The presence of alcohol went unnoticed by the subjects in regard to their perceptions, attitudes, and action decision-making. The main criterion in the interaction with Delage's profile was based on the universe to which it refers (hedonistic, relaxation) and on esthetics. Alcohol appeared as just another element of the scenery. It did not attract attention and was not shocking for most of the subjects. Therefore, we can affirm that the presence of alcohol in this campaign is introduced in a context of normalization, and the integration of alcohol into these scenarios encourages its consumption. This result allows us to understand the success that this campaign had on *Instagram*, accumulating several tens of thousands of likes in a very short time.

3.2. Beliefs about the campaign's influence

The findings described in the previous section illustrate that the subjects perceived a desirable universe where alcohol had a nonconfrontational presence in the photos. The first part of the second questionnaire is now analyzed, in which the subjects were asked for a set of opinions exploring their beliefs regarding the subsequent persuasive influence of social network interaction in campaigns such as this. We thereby explore the subjects' opinions on the supposed effects of cultivation (variable CULTIVATION, CUL).

In the first question, the subjects were asked whether they believed that seeing the lives of some people on social networks, such as the profile of Louise Delage, influences people and their attitudes, values, beliefs, or behaviors (CUL1). The overwhelming majority of the subjects believed that it does indeed have quite a lot (72.7%) or a great deal of influence (27.3%). It is noteworthy that no subject believed that it has no influence at all, perhaps a little, or some. The subjects refer to three reasons to justify their responses: the idea that there is an influence by imitation and conditioning, e.g., influencers affect opinions and behaviors (72.7%) (CUL1B); the influence occurs because the photos show idyllic worlds that attract us, thus showing a projected desire (22.7%); and finally, that influence occurs because some people have inadequacies and insecurities and look to influencers as a mirror in which to look at themselves (4.5%).

> Anti-alcohol push campaigns have not favored the development of healthy behaviors in young people

In the second question, the subjects were asked whether they believed that the presence of alcohol in *Instagram* photos, such as Louise Delage's, could influence people by trivializing the consumption of alcohol. A total of 40.9% said that it has quite a lot of influence, 13.6% said a lot, while 18.2% said somewhat. Regarding those who considered it to have little influence, 13.6% believed that it does not influence at all while 13.6% believed perhaps a little. Therefore, most of the subjects believed that the presence of alcohol could contribute to the trivialization of its consumption (CUL2). Subjects gave six types of arguments to justify their responses, of which three have to do with the trivialization of alcohol, including normalization by associating alcohol and youth (36.4%), association of alcohol with a glamorous life and enjoyment (22.7%), and because instagrammers are models that some follow (9.1%). For 18.2%, there was influence, but little. Two reasons were given for the belief that there is no influence. In one case it was stated that alcohol is not seen in all the photos (4.5%), which is incorrect because alcohol was present in all the photos seen by the subjects. However, these data underline the aforementioned idea that alcohol appears in these photos as a secondary element of the photo's composition. The second reason given for the lack of influence is that seeing a photo of alcohol does not necessarily translate into drinking behavior (9.1%) (CUL2B). In short, a majority of the subjects (86.4%) believed that the presence of alcohol influences the trivialization of its consumption.

Finally, after reminding subjects of the rapid success that this account had in terms of likes on *Instagram*, they were asked whether they believed that the followers of Delage's account who gave likes were aware of what they were liking. A total of 63.6% of subjects believed they were not aware, while 36.4% were unsure. No subject affirmed that they were aware (CUL3). The subjects gave the following explanations to justify their responses. Among those who thought they were not aware, 36.4% believed that people only look at the esthetics of the photo or at something on the surface of the image (clothes, landscapes, and fun), 27.3% were not aware because they were unaware of the real profile that was hidden behind Louise Delage, 22.7% were not aware because they do it automatically without thinking, and 13.6% of the subjects stated that they did not know a reason that answered this question (CUL3B). Lastly, in a fourth question linked to the previous one, the subject was asked whether, in their case when using *Instagram*, they had ever reflected on what it meant for them to like a certain post (CUL4B). Two response categories emerged. In the first, 68.2% of the subjects stated that they do not reflect on it, and when they give a like, they do so because they like the content, it catches their attention, or it reflects their personality; while in the other response category, 31.8% of the subjects said that they do reflect on the like, but only to see if the content fits and corresponds to themselves.

In summary, as posited in H2, the subjects believed that these types of images on *Instagram* influence behavior but without being aware of the significance of interactive actions such as likes.

3.3. Influence of becoming aware of alcoholism

In Phase 2, the subjects were divided into two groups and underwent a different recognition process regarding the "Like my addiction" campaign. Unlike the control group (UNINF), the experimental group (INF) was informed of the campaign's four characteristics.

First, they were informed that alcohol was present in each of Louise Delage's 12 photos. The total percentage of responses was distributed as follows: 69.5% of the subjects stated that they were quite surprised, wondered about the presence of alcohol, and expressed a desire to know why; 13% were somewhat surprised that there was alcohol in all the photos; only 4.3% had not noticed the presence of alcohol, but did not think it was important; and finally, 8.7% said they did not care, as they were not affected by the presence of alcohol because they were nonconsumers or skeptical about the possible effects of alcohol. Overall, this information provokes surprise and a desire to understand (IMP1).

> This research proposes an effective method to promote healthy behaviors on *Instagram*

Second, they were informed that Louise Delage, the instagrammer in the photos they saw, is an alcoholic. A total of 39.1% of the subjects were quite surprised and would like to know how she got to that state of dependence, 26.1% were a little surprised that she is an alcoholic because she looks like a cheerful girl who is just having fun, 13% said the young woman in the photos does not look like an alcoholic, so they would like to know if she tried to hide it in the photos, and 8.7% simply noted that the instagrammer does not look like an alcoholic in the photos (IMP2). On the whole, finding out that the instagrammer is an alcoholic was surprising to the subjects because her image does not seem to reveal this dependence. Third, subjects were then informed that the girl in the photos is not who she claims to be; She is not Louise Delage, but an actress, and the *Instagram* account was a fake. They were reminded that people interacted with this account thinking that this girl was who she claimed to be (she received many likes, had thousands of followers, etc.). In response to this information, 56.5% were quite surprised and would like a detailed explanation as to why this set-up was made, 13% were equally surprised and wondered why the fake account had been made, another 13% were a little surprised that there are people who do these things, and 17.4% were only somewhat surprised because they know that there is a lot of false information circulating on social networks (IMP3). Finally, subjects were informed that Louise Delage's *Instagram* account was created by an organization called *Addict Aide* with the aim of raising awareness about alcohol consumption and alcoholism. In response to this, 69.6% were quite surprised and wanted to know in detail how this campaign was conducted and the results obtained, 26.1% were surprised and wondered how effective the campaign was, and 4.3% were simply a little surprised that this campaign was carried out (IMP4).

The revelation of these four pieces of information about the campaign's true intentions had an impact on the subjects. It provoked surprise, as they could hardly imagine such a reality. It also stimulated a desire to learn more about the campaign to understand the reasons that led to its execution. Finally, the subjects were curious about the possible effectiveness of this type of campaign in general, and of this one in particular. This state of curiosity was conducive to opening up a group discussion regarding the questions raised by these queries and by the experiment as a whole in the final part of the session. Before beginning the group discussion, some questions regarding the influence of learning this information were raised to conclude the individual questionnaire. Specifically, they were asked whether they thought that knowing that Louise Delage is an alcoholic could influence people by causing them to interact differently with the *Instagram* account than they would if they did not know she was an alcoholic (CON1). We found that 81.9% of subjects believed it would have quite a bit or a lot of influence, while few subjects believed it would have very little (9.1%) or some influence (9.1%).

In explaining the reasons for such influence, the subjects cited three arguments: 42.1% thought that knowing that this instagrammer was an alcoholic would make them stop following her and giving likes; for 31.6%, the influence would occur because this information would generate debate against her, while 21.1% argued that alcoholism is a cause for rejection, so the instagrammer would be rejected; and finally, only 5.3% of subjects said that the influence would be slight because alcohol is normalized. Then, the subjects were asked whether they believed that awareness campaigns, such as this one featuring Louise Delage in which a false profile was shown and the problem of alcoholism raised, could be useful to change the behavior of people toward alcohol consumption. The subjects' responses were rated on a five-point scale, with approximately half of the subjects believing that these campaigns are quite (36.4%) or very useful (9.1%), 27.3% believing them to be somewhat useful, 13.6% very little useful, and another 13.6% not at all useful (CON2). In justifying these responses, three reasons were found in favor and one against. Forty-five percent believed that it was useful because in society alcohol is not seen as a problem; for 35% it was also useful but needed to be well explained because the photos alone were not enough, since they were seen as artistic; 5% thought it was useful in the long term; and the remaining 15% believed that it was not very useful because the photos were idealized (CON2B).

3.4. Influence of knowledge and discussion of alcoholism on *Instagram* on behavior change

The results regarding the influence of awareness of and reflection on alcoholism toward the modification of the subjects' behavior on *Instagram*, as posed in RQ3, are presented below.

First, the experimental treatment had significant effects (Figure 1). The UNINF group saw the images of the campaign but had not been subjected to the treatment of being informed of the intentions of the campaign and discussions about it. According to the independent-sample *t*-test, the UNINF group maintained the same behavior on *Instagram* between the pre-test and post-test phase ($t(60)= 0.536$, $p < 0.594$). In contrast, the INF group, which followed the experimental treatment, significantly modified their behavior by reducing their activity on *Instagram* ($t(60)= 4.461$, $p < 0.000$). This shows that being aware of the campaign had an influence on participants' behavior on *Instagram* (confirming H3). This awareness is reflected in the question we asked participants in the last session (Phase 3) about their behavior on *Instagram* after Phase 2. Some subjects in the INF group were unaware that they had reduced their *Instagram* activity or had no explanation (12.4%). However, the majority (87.6%) claimed that their reduced activity on *Instagram* was precisely because the "Like my addiction" campaign had made them reflect on their behavior on *Instagram*. They were now more mindful of what they were doing, particularly with regard to alcohol.

Second, to refine these results and try to delimit more precisely those variables that may influence this outcome, a cluster analysis was carried out to determine whether groups of subjects within the INF group that had a differential response to the campaign's benefits could be identified. The cluster analysis revealed two factors, the first of, which we call "influence and impact," refers to the degree to which the subject believed that disseminating and posting about anti-alcohol campaigns on social media can impact and influence people's attitudes and values. The second factor, which we call "behavioral change," refers to the extent to which the subjects believe that posting information about alcoholics (like Louise Delage) on social networks may influence people to change their behavior in relation to alcoholism. As shown in Figure 2, the cluster analysis identified two groups of subjects: a skeptical group scoring low on both factors, and a permeable group scoring high on both factors and that also shows high impact by the campaign. While the first group does not believe in the campaign's persuasive influence and the ways to counteract the presence of alcohol, the permeable group does believe that this influence exists and can affect the subject.

The behavior on *Instagram* in the pre-test and post-test phases for these two groups of subjects was also analyzed. As shown in Figure 3, skeptical subjects hardly changed their behavior ($t(60)= 0.574$, $p < 0.568$), whereas permeable subjects were influenced by their awareness of the campaign ($t(60)= 2.690$, $p < 0.000$).

Therefore, the higher the degree of belief that the campaign can influence people's attitudes, the greater the change in behavior in the post-test phase. That is, when a (skeptical) subject believes that the campaign will not have a great influence, the campaign's ability to influence the subject is minimized. This is an indirect form of counter-arguing: by delegitimizing the campaign's persuasive capacity, they acquire an argument in favor of retaining their original behavior on *Instagram*.

Finally, a linear regression analysis was conducted to investigate those variables that could influence the change in behavior on *Instagram*. The regression analysis of the set of seven variables in this research revealed that three explain the significant reduction in activity on *Instagram* of the subjects in the INF experimental group. These three variables are KNOWLEDGE, CULTIVATION, and IMPACT, the results of which are presented in Table 2. The greater the subject's awareness that this campaign can influence people, the more reduced the subject's behavior on *Instagram* in the post-test phase. Likewise, the more a subject believes that beliefs, attitudes, values, and behaviors can be influenced by interacting on *Instagram* with

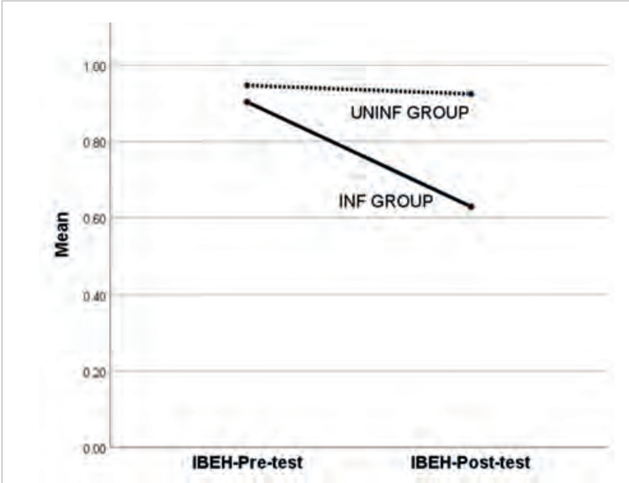

Figure 1. Effect of experimental treatment (UNINF – INF) on *Instagram* behavior change according to the *Ibehi*

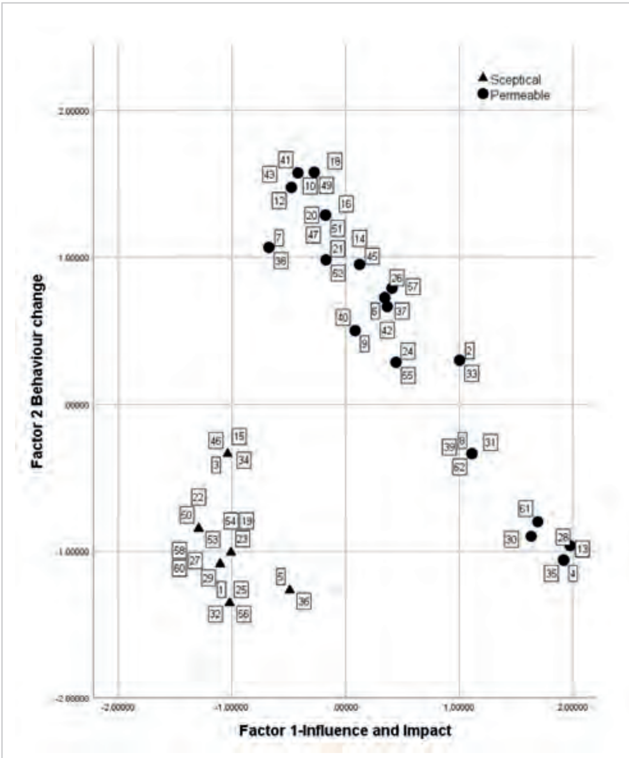

Figure 2. Homogeneous groups identified by the cluster analysis (skeptical and permeable) and two factors (influence and impact; behavior change)

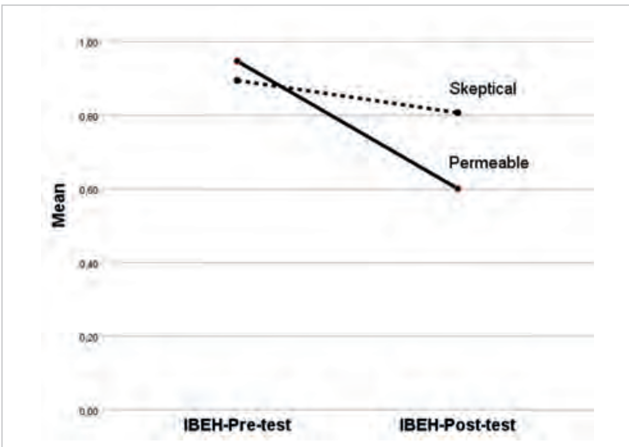

Figure 3. Change in behavior on *Instagram* between the pre-test and post-test phases for the skeptical and permeable groups

profiles such as that used in this campaign, the greater the reduction in the subject's activity on *Instagram* in the post-test phase. The final variable that has a significant influence, albeit less than the previous two, was IMPACT. The greater the emotional impact of knowing the four characteristics of the campaign, the greater the reduction in behavior on *Instagram*.

Table 2. Simple and multiple regression of the variables influencing behavioral change on *Instagram*

	R^2	*F*	*B*	*SE B*	*β*	t	p
Model 1	0.793	303.036 (1.60)					0.000
Intercept (constant)			40.576	2.695		15.056	0.000
Predictor (KNOWLEDGE)			–17.812	0.794	–0.945	–22.428	0.000
Model 2	0.836	230.237 (2.59)					0.000
Intercept (constant)			41.83	2.119		19.745	0.000
Predictor (KNOWLEDGE)			–11.525	1.183	–0.612	–9.739	0.000
Predictor (CULTIVATION)			–6.012	0.963	–0.392	–6.244	0.000
Model 3	0.854	201.833 (3.58)					0.000
Intercept (constant)			41.723	1.807		23.085	0.000
Predictor (KNOWLEDGE)			–8.359	1.206	–0.444	–6.934	0.000
Predictor (CULTIVATION)			–4.388	0.888	–0.286	–4.939	0.000
Predictor (IMPACT)			–4.888	1.017	–0.297	–4.804	0.000

4. Discussion and conclusions

Media psychology has two dimensions, one that is theoretical and seeks to understand the processes and effects of content, media, and technologies (**Van-Den-Bulk**, 2020), and another that is applied. This study implements a procedure to improve communication in the fields of health communication and media education from the perspective of media psychology. The results of this study are twofold:

1) This research provides insight as to why the "Like my addiction" campaign attracted a large number of followers on *Instagram*, and also highlights the effects of the presence of alcohol on *Instagram*, which is likely to influence young people. This is possible because of two factors. The first is that a masking phenomenon takes place; that is, the young person does not consciously focus their attention on the alcohol. This does not mean, however, that it is not perceived. The user was led to appreciate and interact with this profile on the basis of aspects such as attraction to hedonistic themes and relaxation and the esthetics of the photo (as seen in the subjects' responses), while alcohol is only present at a secondary level. These photos receive likes, and in accordance with the uses and gratifications theory (**Moyo**, 2014), the universe they represent is attractive and appealing to young people. Alcohol is incorporated and diluted in this represented universe, and this in turn contributes to a lack of critical thinking in the young person's thought process, increasing the efficacy of the message. This masking strategy is very different from that used in traditional advertising, as illustrated by the example in Image 1. In this case, alcohol was highlighted in the foreground and an explicit persuasive message was pushed to the receiver, often prescriptive, moralizing, or fear-inducing (e.g., don't do this; you will damage your health). In contrast, we see that, in the pull strategy of masking, there is no explicit attempt at persuasion. Alcohol is not in the foreground but rather subordinate and integrated into the fictional universe of a scene that is attractive to young people (Image 2).

The second factor concerns the process of normalization. The subject perceives the presence of alcohol, but tolerates it and is not bothered by its presence. Given that there is no rejection and that there is repeated tolerance in all the photos, the cultivation of representations linking alcohol to these scenarios of enjoyment is favored (as seen in the 12 photos of Louise Delage in Annex). This contact with media content increases cultivation effects and influences the user within the framework of these pull strategies. In addition, as the analysis of the CULTIVATION variable showed, there is a "third-person effect" (**Antonopoulos** *et al*., 2015) that makes participants believe that the presence of alcohol will influence others but not them.

In short, the masking and normalization factors are closely connected and explain why the presence of alcohol is effective in negatively influencing young people's values and attitudes toward alcohol on *Instagram*. However, there is room for optimism, as shown by the results of the second part of this study.

2) Young people believe that this type of campaign can influence behavior but this is not enough. This research has shown that the campaign alone is not enough to induce behavioral change (as is the case for the UNINF group). It is also necessary to explicitly disclose the campaign's motives in a dialectical and interactive context in which the young person is actively involved. For a positive behavioral change to occur, it is necessary to become aware of and discuss the campaign's features and intentions (as seen with the INF group). Young people should be involved directly in the process, but in terms of rai-

> Young people who follow the tested method become aware of the presence of alcohol on *Instagram*

sing awareness supported by a pull strategy instead of the direct persuasion attempt seen in traditional anti-alcohol push campaigns. The pull strategy encourages young people's curiosity, as seen in their desire to have questions about the campaign answered (Is Louise Delage an alcoholic? Why? Etc.). The method started from the point of information collection, i.e., raising individual awareness, toward a change in behavior on *Instagram* to become more favorable to the prevention of alcoholism. This followed the process suggested by the Piagetian genetic epistemology theory (**Piaget**, 1985), which starts from the periphery of knowledge, and advances in a student–teacher dialectic process toward the center of knowledge, ultimately leading to a modification of behavior. This dialogical method, which also draws on activity theory (**Leontiev**, 1981; **Engeström**, 2014, **Bermejo-Berros**, 2021), is also aided by the fact that it is effective in changing behavior among groups identified as "permeable" and sensitive to such an awareness-raising process. Perhaps, exposure to a longer awareness-raising process would also be effective among "skeptical" people. This hypothesis could be developed in future research with new campaigns using such social media pull strategies. Likewise, the change in behavior experienced by the INF group can also be explained through the lens of self-persuasion employed by the strategy (**Loman** *et al.*, 2018). While traditional push campaigns used a strategy of direct persuasion (which often generates resistance and rejection among young people), in this study, a pull strategy was employed (providing a noncoercive or prescriptive context of interaction with young people). The young person in the INF group becomes successively more interested in a story that responds to the questions posed (the second part of Phase 2), arouses their curiosity, and facilitates a progressive process of self-persuasion.

In conclusion, from an educational and communicational point of view, the results of this study suggest that an effective way for an anti-alcohol campaign to connect with young people and induce self-persuasion can be direct participation through knowledge-sharing in a dialogical–critical context. Regarding the field of media psychology, this study illustrates the usefulness of investigating not only media effects on beliefs, attitudes, and behaviors but also of connecting them with practical applications that are beneficial for both the individual and society.

5. Annex

Photographs of the campaign and the items of all the scales and variables included in the questionnaires, available at:
https://uvadoc.uva.es/handle/10324/52682

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Thanks for joining our life: Intimacy as performativity on *YouTube* parenting vlogs

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Abstract

YouTube is currently becoming one of the main international platforms for amateur creators attempting to attract followers through a multiplicity of audiovisual content and engagement strategies based on search and algorithmic recommendation systems. In many cases, this environment, and especially its users, try to adapt to a celebrity network pattern on the basis of the construction of seemingly authentic and close relationships, leading to relevant phenomena such as parenting vlogs. This kind of content is focused on the presence of intimate moments that reflect the daily life of influencers or micro-influencers, capturing large numbers of followers, as well as important communication and information strategies. From this perspective, and through a quantitative content analysis of 1,034 videos and more than 900 viewing hours on two very popular *YouTube* family influencer channels, this study explores the degree of intimacy portrayed in their video content as performative strategies that configure the profiles' post through interactions with followers, brands, and self-promotion. The results suggest that the degree of intimacy shown in this content becomes a performative process for these family youtubers, whereby the more intimate the exposure, the more popular the information offered to the user. In short, this type of content prioritizes the routines of the youtubers, who include their closest family members and friends as a means of attracting attention, while dedicating their time to interacting with brands (advertising) and recording, editing, and submitting a vast amount of personal and private information on the platform (dissemination) in a sort of promotional–private performativity.

Keywords

Social media; Intimacy; Performativity; *YouTube*; Platforms; Vlogs; Influencers; Content creators; Family; Sharenting.

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1. Introduction

Today's convergent and participatory culture has brought the possibility to create, produce and disseminate content to an extent never seen before (**Jenkins**, 2006). This new media configuration empowers users to become producers of content and enables them to harness a significant following (**Marwick**, 2015). In this ecosystem, *YouTube* rises as one of the leading participatory platforms (*SensorTower*, 2021), emphasizing the "celebrification" phenomenon (**Driessens**, 2013a); where regular people become microcelebrities or so-called influencers (**Abidin**, 2018; **Marwick**, 2015; **Senft**, 2013).

Among the different types of content and profiles, family vlogs and their related microcelebrity have become common (**Abidin**, 2017; **Lanza**, 2020). Microcelebrities are content creators who amass a niche following who connect through follows, interactions and views (**Dezuanni**, 2020). In the case of family vloggers, children participate in their parents' productions, broadcasting many aspects of their lives (**Feijoo** *et al.*, 2021). Moreover, although one may think that children are central to family vlog productions, social media anthropologist Crystal **Abidin** (2017) states that within the parenting blog genre, children are not the focus, as the main spotlight is centered upon the routine experiences of parenting.

In this environment, parent vloggers –similar to other content creators attempting to increase the visibility and impact of their channels– share different aspects of everyday life and try to find innovative ways to attract followers and achieve visibility (**Jorge** *et al.*, 2021). This need to create content and engage communities is an important consideration, as the quest to monetize may motivate parent vloggers to share aspects of their lives considered private and intimate (**Nottingham**, 2019). This study aims to explore Spanish family channels on *YouTube* through the concept of intimacy, with three specific objectives:

- To systematize the characteristics that define a family channel on *YouTube*;
- To analyze the degree of intimacy within parenting vlog channels; and
- To correlate intimacy and performativity on *YouTube* parenting vlogs.

2. Literature review

2.1. *YouTube*'s impact in the platform era

The characteristics that define social media are also the ones that make them successful among their users, who generate, share and viralize content. These platforms could be defined as digital meeting points for people with common interests (**Flores-Vivar**, 2009). These "nodes" of virtual relations enable the creation of a profile, which delimits the set of users with common interests, while providing the possibility to follow the activity of people within the platform (**Cabalquinto**; **Soriano**, 2020; **Casilli**; **Posada**, 2019). *YouTube* is a social media platform, and a Google subsidiary, where users upload and share audio-visual content, generating communities. The traits that characterize *YouTube* in the social media ecosystem include the possibility of creating a profile for each user, which allows sharing and publishing content, as well as functionalities that enable interaction with other profiles and community content related to promotions, self-branding or giveaways (**Tur-Viñes**; **Núñez-Gómez**; **González-Río**, 2018; **Androutsopoulos**; **Tereick**, 2015).

This rise of online communities on social media has given way to phenomena of interest in terms of the interactions and relationships between creators and audiences. In this scenario, *YouTube* positions itself as one of the leading platforms, with more than 2 billion monthly users and approximately a billion hours of video viewed every day (*YouTube*, 2022). According to *Alexa* (2021), this platform ranks second in terms of traffic worldwide. This has enabled the emergence of multiple creators attempting to harness this viewership for popularity and monetary gain.

Youtubers are understood as those who create and share videos on the platform aimed at attracting and engaging with a community of followers (**Pérez-Torres**; **Pastor-Ruiz**; **Abarrou-Ben-Boubaker**, 2018). The youtuber phenomenon emerges as a reflection of reality TV, where children, teenagers and family influencers participate (**Stefanone**; **Lackaff**, 2009; **Fernández-Gómez**; **Fernández-Vázquez**; **Feijoo**, 2021). In this sense, family influencers have been identified as a genre that is characterized by musical and comedic content to engage followers, enveloped in routine chores and domesticity (**Abidin**, 2017). The specific characteristics of family vloggers on *YouTube* lend themselves to the analysis of the types of productions shared in their quest for periodic content generation, as well as the possible implications of this process for all the members of the family (**Tambunan**, 2020). Moreover, the monetization of User Generated-Content (UGC) on *YouTube* has been identified as a catalyst for increasingly personal and intimate relationships between followers and influencers (**Raun**, 2018). Social media influencers have positioned themselves as important intermediaries between companies and consumers with relevant implications for family vloggers (**Enke**; **Borchers**, 2019).

2.2. Intimacy, parenting as self-representation and performativity

The presence of intimate content on social media, and specifically on *YouTube*, has been analyzed in the context of vloggers, who use it as a strategy to establish trust and closer relationships with followers (**Marôpo**; **Jorge**; **Tomaz**, 2019). Beauty vloggers' success has also been related to the degree of intimacy of their content, who in some cases have been able to commodify their status as microcelebrities through the inclusion of increasingly intimate content (**Berryman**; **Kavka**, 2017; **Castillo-Abdul**; **Bonilla-del-Río**; **Núñez-Barriopedro**, 2021). Trans vloggers have also been successful in generating support through the inclusion of intimacy in their productions (**Horak**, 2014). Negative self-disclosure has also been the focus of analysis as an example of intimacy made public (**Berryman**; **Kavka**, 2018). These studies suggest that the presence of intimate moments in influencer content is common and strategic to connect with the audience and create an idea of closeness (**Wang**; **Lee**, 2020).

Moreover, **Raun** (2018) emphasizes the importance of intimacy as a form of "affective labour" and a defining trait of successful influencers attempting to establish themselves as accessible, available, present, connected, authentic, and collective (**Melonçon**; **Arduser**, 2022). **Marwick** (2015) points out that microcelebrities use intimacy as a strategy within specific cultural norms, in a process of negotiation and unique content regulation. In this sense, **Raun**'s (2018) defines intimacy on *YouTube* as a genre with an aesthetic structure of affective expressions that involves aspects such as the thoughts, dreams, food consumption, and the home of influencers. **Raun**'s (2018) explanation fits into **Hearn** and **Schoenhoff'**s (2016) description of the engagement of social media influencers, who argue that such aesthetics illustrate attention-seeking strategies. It is important to note that the nature of social media influence and celebrity is closely related to the maintenance of interest and interaction by their followers through the creation of content that engages a specific audience through self-branding and the positioning of the content producer as an "opinion leader" in their field (**Silva**; **Quelhas-de-Brito**, 2020). Self-branding has been pointed as a form of affective labor undertaken in purpose by content producers to gain increased attention (**Hearn**, 2008). Thus, self-branding and self-representation become closely related in the social media sphere.

The relationship between the expectations of viewers and followers as determinant in the characteristics of the content produced and behaviors displayed has been well established (**Hearn**; **Schoenhoff**, 2016). Some scholars have identified a so-called "attention economy" (**Senft**, 2013) referring to the exchange of content for attention that can be measured in metrics such as the number of subscribers, views, likes, or comments (**Banks**, 2021). While these considerations are important for most social media influencers, the sharing practices of families in this environment have unique traits. In this sense, media scholars **Blum-Ross** and **Livingstone** (2017), have described the sharenting phenomenon as the act of "sharing representations of one's parenting or children online" (p. 110). They conceptualized these practices considering the identity of content producers as it is reflected by their parenting behaviors, practices, and their intricacies with their networked self (**Papacharissi**, 2011; **Vizcaíno-Verdú**; **Aguaded**, 2020). These controversial practices reflect the complexities of modern parenting as a central aspect of self-representation on social media (**Holiday**; **Norman**; **Densley**, 2022) as is the case with parenting vloggers. **Nottingham** (2019) cautioned about the balance between the need of parent vloggers to continuously produce content that attracts attention and the lack of regulation in terms of privacy and workload for minors in these productions.

The idea of intimacy is related, as indicated by **Jerslev** and **Mortensen** (2015) and **Busse** (2017), to the concept of performativity, understood as media content that performs an action. In this study we consider influencer performativity as a backstage practice, in which these profiles create a sense of intimacy through languages and cultural components that create affiliations (in this case family-related) with followers, attempting to convey an apparent authenticity (**Marwick**; **Boyd**, 2011). In this sense, intimacy becomes performative as part of the youtuber's self-expression and identity construction as a celebrity. The performative nature of the content is subordinated to the establishment of the creator's self-concept on social media by exposing private information within immediate and phatic communication (**Rubio-Hurtado** *et al.*, 2022). Other authors mention this model of performativity as a strategy to invite people into the intimate lives of celebrities, who become the main attraction of some communities. This is understood as a continuous reality built upon celebrity capital (**Collins**, 2014; **Driessens**, 2013b). For instance, **Elorriaga-Illera** and **Monge-Benito** (2017) described how Verdeliss' profile evolved from an amateur to a professionalized channel as her content displayed increasingly more branded content that adapted to the day-to-day activities of the family. Thus, these authors' description of the 'slice of life' as a relevant genre for brands is noteworthy for our analysis of these two influencer channels, as these moments in daily life become more prevalent within the channels, as they gain visibility and success (**Jaramillo-Dent** *et al.*, 2020).

In the current media ecosystem, *YouTube* raises new amateur means of expression (**Castillo-Abdul**; **Romero-Rodríguez**; **Balseca**, 2021) for public intimacy, where the subjects hold partial control over their own privacy, and the main creator decides the extent to which intimacy is developed. Moreover, once the contents are shared, control over them is lost (**Baigorri-Ballarín**, 2019). These sharing practices include ordinary daily activities such as what they eat, who they live with, where they go, what they buy and what they think, displaying aspects of life that, until recently, belonged to intimate life, exalting the ordinary of private lives (**Sibila**, 2008; **Martín-Criado** *et al*., 2021).

3. Method

In order to respond to the objectives and the following research questions, we conducted an exploratory-descriptive analysis, followed by a correlational analysis between items related to intimacy and performativity. The questions and hypotheses driving the research were:

- RQ1: What characterizes a family channel on *YouTube*?

    H1. Family *YouTube* channels are characterized by a daily performance of their intimate activities, in which they involve interests and people.

- RQ2: How much intimacy is shared on family *YouTube* channels?

    H2. The level of intimate content shared on Spanish family *YouTube* channels is high.

- RQ3: Is there any relationship between the performative nature of *YouTube* parenting vlogs and the intimate activities?

    H3. Performativity correlates with intimacy in *YouTube* parenting vlogs.

For this purpose, we carried out a quantitative content analysis (**Riffe**; **Lacy**; **Fico**, 2014). Consequently, we validated the research instrument through Krippendorff's α to assess intercoder reliability (**Krippendorff**, 2004). In addition, we used an ordinal scale to analyze of the degree of intimacy and performativity (**Orlandoni-Merli**, 2010). This procedure enabled the measurement of attributes and qualities, ordering them from high to low on a scale of 1 to 10, where 1 was equivalent to a lower degree of intimacy, and 10 to the maximum level of intimacy (**Coronado-Padilla**, 2007).

3.1. Sample

The following inclusion parameters were considered in delimiting the sample: a) youtuber channels; b) family theme displaying everyday routines (parenting vlogs); c) integration of one or more people who share a kinship with the youtuber; d) households with children; e) channels with over 50,000 followers on *YouTube* and over 50,000 followers on Instagram; f) a frequency of publications of at least one or two videos per month.

The resulting sample was further delimited using purposive sampling (**Palys**, 2008), obtaining a final count of 1,034 videos up to September 2021 (from two top Spanish parenting vlogs) (Table 1). The number of videos selected from each channel corresponds to the frequency of publication within the channel, thus, if content was published more often, the sample from said channel includes a higher number of videos. Content and images from these channels were not shared in the results, since the audio-visual content provided by the families introduced minors, adhering to the ethical principles of the *APA Code of Conduct* (*American Psychological Association*, 2017) in order to preserve the privacy and anonymity of children.

Table 1. Sample of family channels on *YouTube*

Channel	Country	Family unit	Children	N. of followers on *YouTube* and *Instagram*	N. of videos selected	Frequency of publication
JustCoco Vlogs	Spain	Four members	Two descendants	957,000 on *YouTube* and 490,000 on *Instagram*	711	Minimum 3 weekly videos
DaddyHappy Vlogs	Spain	Four members	Two descendants	78,600 on *YouTube* and 53,900 on *Instagram*	323	Minimum 1 monthly video

33.2. The codebook

The codebook was derived through the operationalization of variables by transforming abstract concepts into observable and measurable items. For this, we applied the **Arias-Odón**'s (2012) procedure, establishing dimensions and items. See the complete codebook in:
https://doi.org/10.6084/m9.figshare.14414699.v2

The main variables were derived from previous studies (**Abidin**, 2017; **Hearn**; **Schoenhoff**, 2016; **Notthingham**, 2019; **Pérez-Torres** *et al*., 2018; **Raun**, 2018; **Tur-Viñes** *et al*., 2018). These variables were identified according to the framework previously discussed in terms of influencer performativity and intimacy on social media. Then, two of the authors individually codified a subset of the sample through a codebook comprising each of the videos, for the purpose of the subsequent quantitative analysis. We finally calculated intercoder reliability through Krippendorff's α with a resulting coefficient of .729, which validated the coders using this codebook for analysis. Likewise, a Cronbach's Alpha of .770 was obtained.

4. Results and discussion

4.1. Descriptive analysis: Hypothesis 1

To analyze the results, we looked at three general variables that were subdivided into different specific dimensions. Within the variable 'Performative identity', four dimensions were analyzed: a) Community impact; b) Self-concept; c) Communication style; d) Content and topics. This distinction enabled the definition of the profile and online self-expression of the youtuber (Table 2). In relation to this first dimension, the mean presented neutral values (1.98) and the standard deviation showed values close to 1 with significant statistical differences. This item was comprised of four response options linked to the number of views of the selected vlogs (From 0 to 10,000/ From 10,000 to 500,000/ From 500,000 to 1,000,000/ More than 1,000,000 views). Thus, it is worth noting that the average was close to intermediate preferences. These channels reached 10,000 to 500,000 views by network users.

Table 2. Performative identity variable

Dimension	Variable	N.	Min	Max	Mean	SD
Community impact	Views	1,034	1	4	1.98	.457
Self-concept	Displayed self-esteem	1,034	1	4	3.45	.577
	Description of the self	1,034	1	4	3.99	.132
Communication style	Spontaneous speech	1,034	1	4	3.92	.496
	High and emphatic tone	1,034	1	4	3.90	.543
	Unique labels	1,034	1	4	3.83	.702
Contents and topics	Themes	1,034	1	4	1.50	.899

Regarding the self-concept variable, two aspects were considered. On the one hand, the level of self-esteem the youtuber displayed in the video, and on the other hand their self-description, observing whether it was positive or negative. Moreover, the level of displayed self-esteem yielded values close to 4 (3.45), indicating that their displayed self-esteem is positive. However, the standard deviation decreased (.577). This figure described the existence of significant statistical differences in relation to the two channels. On the other hand, the description of the self-revealed values that were very close to 4 (3.99). Which means that youtubers define themselves positively. In contrast, the standard deviation presented irregular values (.132) with remarkable statistical differences. This result reflected disparities between the two channels, which may be influenced by their level of popularity (the more popular, the higher the displayed self-esteem and the feeling of acceptance by the community).

In terms of communication style, three traits were considered: spontaneous speech, elevated and emphatic tone, and unique entrance and exit etiquette/greetings by the youtuber. The first item (spontaneous speech) yielded values close to 4 (3.92), while the standard deviation was high (.496), leading to significant statistical differences. The second item (elevated and emphatic tone) showed means of approximately 4 (3.90) and a standard deviation relatively close to 1 (.543). The third item (unique opening and closing utterances) showed a result close to 4 (3.83) and a standard deviation that did not present significant statistical differences (.702). In short, the profile of the analyzed influencer stands out for the use of stipulated, reiterative, and identifying messages, as well as for the use of a friendly and spontaneous speech.

Regarding the observed subjects, the results presented neutral values in the mean (1.50), while the standard deviation showed values close to 1 (.899). There were no significant statistical differences. This question is organized around four thematic axes:

- Detailed family routine parenthood/family milestones;
- Interests (fashion, sport, video games, etc.) dreams, thoughts, and projects (past and future);
- Advice/suggestions to the community;
- Other topics.

These data showed us that the most recurrent contents are those related to family and parenthood.

Within the variable 'Brands and self-promotion' three dimensions were examined (Table 3):

- Participation encouragement and promotion;
- Creation and promotion of the personal brand;
- Raffles, contests, and gifts.

Continuing with the study and observing the first dimension, we found that the means showed values close to 4 and standard deviation scores close to 1. The items that achieved high scores included invitations to visit accounts on other platforms (3.86) and invitations to watch other videos on the channel (3.77). On the other hand, items with the lowest scores included the mention of the number of subscribers in the video (celebrations, etc.) (1.70) and the direct request for comments and/or opinions (3.56). This suggests that influencers depended to a greater extent on the viewing of the videos, as well as the increase in followers on their other accounts or channels on their different active social media profiles.

In relation to the second dimension, from the three items only one came close to 4, brand promotion (3.35), while personal brand awareness (1.71) and brand ambassadors (1.30) yield low averages. These figures implied that youtubers use minimally their channels for the dissemination of their personal brand, acting as managers or representatives of brands. As for the standard deviation, high values close to 1 were obtained, confirming the absence of significant statistical differences in the study sample.

Finally, in the third dimension, we found very low averages, with raffles, contests and gifts yielding the higher scores (1.42), followed by strategies for meeting with fans by means of other people's brands (book signings, etc.) (1.29) and attending public spaces to meet with fans (1.05). However, most standard deviation values were close to 1, except in one of the cases. Thus, we saw significant statistical differences. This suggested that the analyzed youtubers were not characterized by a strategy in terms of meetings and raffles.

Table 3. Brand and self-promotion variable

Dimensión	Variable	N.	Min	Max	Mean	SD
Participation encouragement and promotion	Crutch expressions	1,034	1	4	3.86	.631
	Direct request for comments	1,034	1	4	3.56	1.507
	Mention of subscribers	1,034	1	4	1.70	1.267
	Invitation to other channels	1,034	1	4	3.77	.802
	Invitation to other accounts	1,034	1	4	3.86	.631
Creation and promotion of the personal brand	Personal brand dissemination	1,034	1	4	1.71	1.278
	Brand promotion	1,034	1	4	3.35	1.234
	Brand ambassadors	1,034	1	4	1.30	.907
Sweepstakes, contests and gifts	Raffles, contests and gifts	1,034	1	4	1.42	1.045
	Meeting with supporters/ attendance	1,034	1	4	1.05	.393
	Meeting with followers-strategies	1,034	1	4	1.29	.883

In the variable 'Degree of intimacy' the dimensions have been grouped in two areas: matters related to intimate data (information) and those concerning intimate practices (practice and behavior). In relation to intimate data, three dimensions were analyzed (Table 4):

- Personal and contact information;
- Work and academic background (youtuber/family);
- Location exposure.

The first dimension offered neutral values. However, the standard deviation was very high and therefore no significant statistical differences were found. The items that achieved the highest scores included full name (3.15), email (2.80), and beliefs (2.54), as opposed to sexual orientation (1.01) and date of birth (1.19). From these data, we could point out that, despite sharing their intimate, personal and family life with the virtual community, not much personal contact information is shared, except for an email address created for a specific activity (e.g. receive messages from the followers).

In the second dimension, related to the work of the youtubers studied and/or their relatives, the means and standard deviation showed descending values. This confirmed significant statistical differences throughout the videos analyzed. Those items that had achieved higher scores included current/former youtuber/family employment (1.63/1.39), followed by the location of the current/former employment/training center (1.33/1.12) and training, formal/non-formal education (1.02/1.03). In short, it should be noted that the youtuber mentioned this type of information only to a limited extent.

The third dimension was notable for high means close to 4, as well as an upward standard deviation, meaning there were no statistical differences. The items with the greatest impact were the places visited by the youtubers and their families/ friends (3.34) and youtubers' country/city/household (3.09). Those with the least impact were the youtubers' and their relatives/friends' next destinations (1.64) and the country/city/household of their relatives/friends (2.13). This suggests that the contents of interest are those related to the main characters of the vlog.

In line with the practices of intimacy we compared two dimensions:

- Family environment/friendship;
- Image protection.

The first dimension pointed to low values in relation to the mean. However, the standard deviation was high with no statistical differences. The highest ranked item was the representation/integration of members of the same family household (3.67) and the presentation/integration of relatives outside the family household (2.15), compared to the presentation/integration of acquaintances/neighbors (1.29), the presentation/integration of friends (1.72). In conclusion, these influencers focused on the presentation of themselves (performative identity), mainly, and of the people who live in their family unit, who in some way, participated directly and indirectly in the productions of the vlog.

Finally, the last dimension showed a high average in the items of photographic/audio-visual/informative exposure of older relatives (3.41) and photographic/audio-visual/informative exposure of underage relatives (3.16). The explicit statement (oral or written) on image rights of youtuber and/or relatives (1.23) received the lowest rating. The results of the

Table 4. Intimacy variable

Dimension	Variable	N.	Min	Max	Mean	SD
Intimate data						
Personal and contact information	Full name	1,034	1	4	3.15	1.354
	Date of birth	1,034	1	4	1.19	.723
	Email	1,034	1	4	2.30	1.487
	Phone number	1,034	1	4	2.31	1.487
	Postal address	1,034	1	4	2.80	1.430
	Beliefs	1,034	1	4	2.54	1.500
	Sexual orientation	1,034	1	4	1.01	.186
Work and education (youtuber/family)	Current/previous employment youtuber/relatives	1,034	1	4	1.63	1.224
		1,034	1	4	1.39	1.014
	Training, formal/non-formal education	1,034	1	4	1.02	.246
		1,034	1	4	1.03	.321
	Location of current/previous employment/training center	1,034	1	4	1.33	.940
		1,034	1	4	1.12	.586
Location exposure	youtuber's country/city/household	1,034	1	4	3.09	1.380
	Country/city/relatives' home/friends	1,034	1	4	2.13	1.454
	Places visited by youtuber/relatives/friends	1,034	1	4	3.34	1.244
	Upcoming youtuber/relatives/friends' destinations	1,034	1	4	1.64	1.232
Intimate practices						
Family/friendship environment	Introduction/integration of members of the same family home	1,034	1	4	3.67	.936
	Introduction/integration of relatives outside the family home	1,034	1	4	2.15	1.460
	Introduction/integration of friends	1,034	1	4	1.72	1.282
	Introduction/integration of acquaintances/neighbors	1,034	1	4	1.29	.891
Image protection	Explicit statement (mention or written) about image rights of the youtuber and/or relatives	1,034	1	4	1.23	.802
	Photo/Audiovisual/Information exposure of adult relatives	1,034	1	4	3.41	1.190
	Photo/audiovisual/information exposure of underage relatives	1,034	1	4	3.16	1.345

standard deviation indicated that there were no significant statistical differences. Image protection was an important issue. However, in the different units analyzed we did not observe explicit direct/indirect mention of image rights, although we found constant exposure of family members.

With this section, we conclude the descriptive analysis of the sample concerning the parenting vlog channels, supporting the first research question and hypothesis. Parenting vlogs on *YouTube* use their channels to share daily experiences through patterns such as self-concept, self-brand promotion, and other interactions with their family and community of followers. Parenting vlog youtubers present themselves using a positive, friendly, and spontaneous speech. These channels focus their contents on intimate aspects of family and parenting, where followers have a leading role. Influencers constantly mention their followers to convey appreciation. Indeed, most content and engagement strategies carried out with followers involve direct physical or online interaction (Lives, Q&A, etc.) as a means of communication. Other particularity of these influencers is the intimate information offered, which increases in parallel with their success. In other words, the results indicate that the greater the involvement of the followers, the more intimate information is offered by the influencers (thoughts, concerns, doubts, recommendations, sharing of intimate family milestones...). In short, these daily performances display constant intimate activities based on the influencers' own interests, but also in response to their followers' requests.

4.2. Analysis of the degree of intimacy: Hypothesis 2

In order to evaluate the degree of intimacy of the two accounts, we used an ordinal scale from 1 to 10, where 1 reflects a low level of intimacy and 10 a high degree of intimacy. To do this, we calculated the total dichotomous (yes/no) options chosen in the previous analysis and converted these data into a scale from 1 to 10 (Figure 1).

Our analysis found that there was a greater degree of intimacy in content that revealed information about the youtuber than that of relatives, friends, and people outside the channel. The values with the highest degree of intimacy corres-

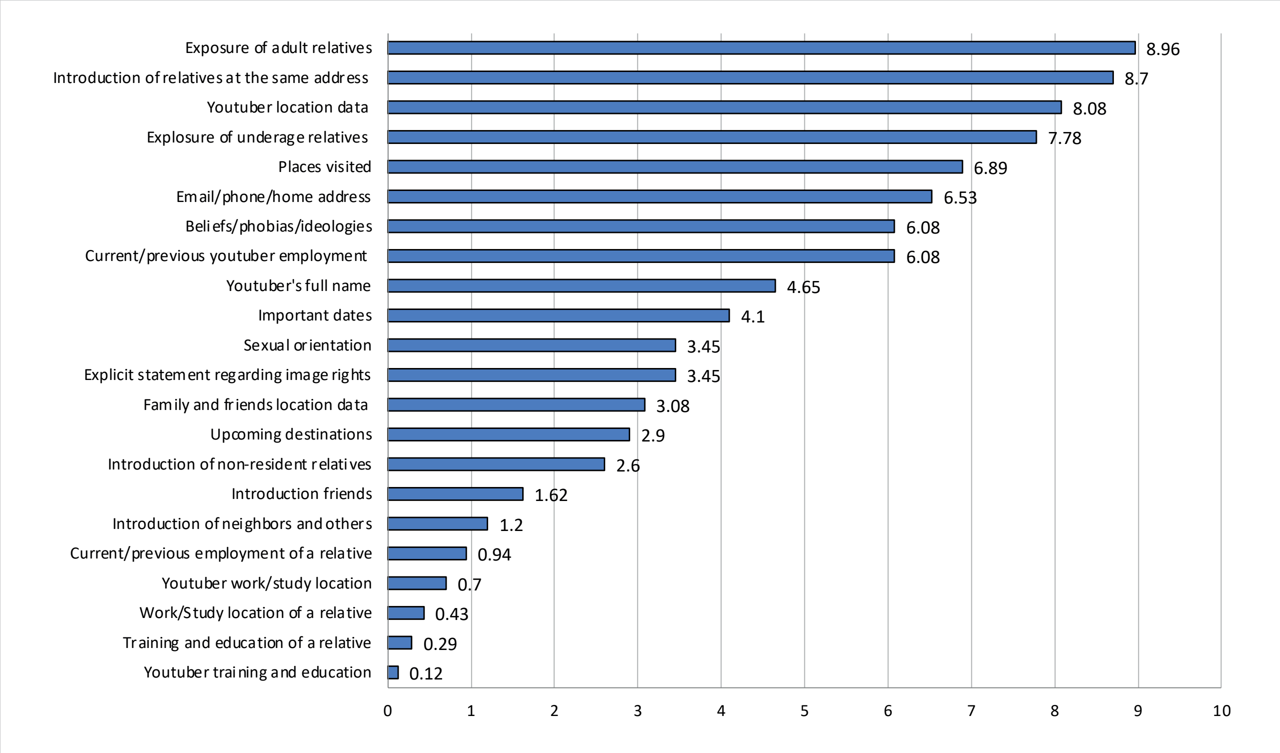

Figure 1. Evaluation of the degree of intimacy in the two parenting vlogs

ponded to exposure of adult relatives to the camera (8.96 out of 10), presentation of members of the same family home (8.7 out of 10), youtuber's location data (8.08 out of 10), exposure of minors (7.78 out of 10), location of the places visited (6.89 out of 10), youtuber's contact information (6.53 out of 10), and information about the youtuber's current employment or academic data (6.08 out of 10). The latent presentation of information by the youtuber stands out from this compilation, as well as a clear predisposition in these family videos to expose minors (usually the youtuber's own children). Some transcribed examples of videos concerning these items were collected in Table 5, and Figure 2 shows an illustrated rendering of a screenshot of a family intimate moment.

Table 5. Examples of variables reflecting high intimacy levels per channel

Category	Channel 1	Channel 2
Adult relatives to the camera	And here she is at last, my friend! For those of you who don't know her, she's one of my best friends since childhood.	The Familukis! I haven't had time to introduce them. He's been messing with my hair all weekend.
Presentation of members of the same family home	This is my mom. Say hi mom! We always go shopping together, right mommy?	What's the sister like? Tiny. She's eating. This gift is for her to play with, isn't it?
Location data	And my mommy and I are going shopping. We always take the same route, don't we, Mommy? *Lidl*, *Alcampo* and *Carrefour*.	We came to the Disney store and that's all, what? Expensive. What do you want?
Exposure of minors	Can you help me? Can you tap your little brother with the little sponge very gently?	I'm taking the opportunity to record you now because with your ding-a-ling out in the air, I won't be able to record you.
Location of the places visited	Where are we going? We're going to the UK!	We're in Dad's car and we're on our way to Valencia.
Youtuber's employment or academic information	So since I have commercial and administrative experience, I'm pretty good with computers...	I'm a National Police officer and I take great pride in my work, as well as my work as a youtuber.
Contact details of the youtuber	We're on our way to the post office to open a postal box so you can send us little things! We left the info in the description.	If you want to appear in my videos, send me your personalized intro saying: 'Hey, what's up gang, wake up now that you're dozy! to this e-mail…'
Believes, phobias, ideologies	Oh, I just can't. Kill her, or get her out of here. But I really can't handle spiders since I was a kid.	We're getting ready for Christmas. What are we going to do? A Christmas tree. Are you up for it, Neo?

Conversely, values with a lower range of intimacy referred to content that offered information on the place of work or study for relatives and friends (0.41), the type of training and education of relatives (0.35), the place of work or study for the youtuber (0.7) or the youtuber's own academic information (0.1). In total, an average of 3.67 was obtained in terms of the degree of intimacy in both accounts. Despite the lack of explicit statements on rights or image protection in the vlogs, family members across different age ranges are exposed visually in the content analyzed.

In this case, the hypothesis was not completely proven, since the degree of intimacy does not seem to be high in videos where commercial content and corporate collaborations are the main focus. However, in terms of intimacy, aspects such as the youtuber's thoughts, beliefs and ideas stand out, as well as the presence of family, friends, and minors in their daily routine.

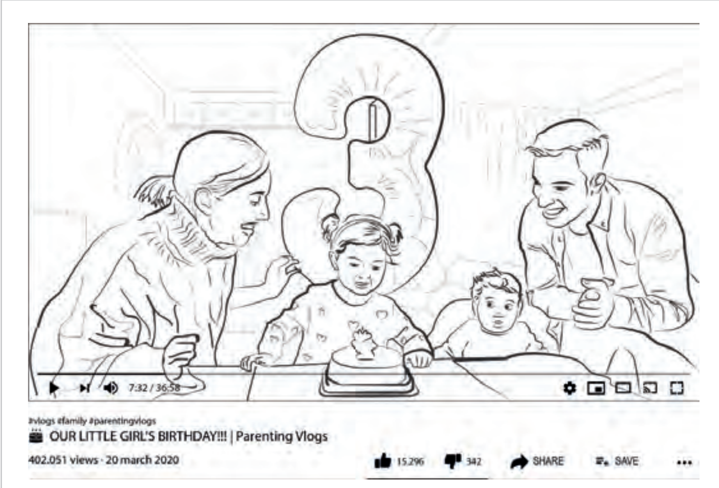

Figure 2. Rendering of a screenshot of a family event

4.3. Intimacy as performativity correlation: Hypothesis 3

To conclude the analysis, we conducted a correlation between the variables related to performativity and intimacy to understand this practice as a phenomenon that is associated with family performance on *YouTube*. First, we used the Kolmogorov-Smirnov test to assess the normality of the distribution (related to the averages of performativity and intimacy dimensions), since our sample is larger than the standardized sample base (n>50). We found that the significance level was low (K-S(1,034)=.403, *p*=.001). Accordingly, we applied the Spearman correlation test for nonparametric interval data (Table 6).

Table 6. Intimacy as performativity Spearman correlations

Performativity	Personal information	Youtuber work/education	Family/friends work/education	Family/friendship environment: introduction of members of the same/outside home	Exposure (adults)	Exposure (children)
Self-concept	.329**	-.126**	-.042	-.142**	-.074*	-.096**
Sig.	.001	.001	.179	.001	.018	.002
p	.57	.35	.20	.37	.27	.31
1-β	1	1	.99	1	1	1
Self-described positively or negatively	-.030	.017	.013	.023	.032	.026
Sig.	.335	.594	.673	.469	.304	.402
p	.17	.13	.11	.15	.17	.16
1-β	.99	.99	.99	.99	.99	.99
Communication style	.197**	.150**	.066*	.186**	.256**	.175**
Sig.	.001	.001	.034	.001	.001	.001
p	.44	.38	.25	.43	.50	.41
1-β	1	1	1	1	1	1
Contents and topics: family routine, interests, dreams, advices	**.147***	.028	**-.033***	**-.108****	-.042	-.022
Sig.	.001	.361	.288	.001	.180	.473
p	.38	.16	.18	.32	.20	.15
1-β	1	.99	.99	1	.99	.99

*Sig.<.05, **Sig.<.01; *p*=.10 low, .30 medium, .50 high

Following the Spearman's test, we found statistically significant relationships between some of the variables related to performativity and intimacy. First, we identified that items collected on self-concept were significantly associated with sharing personal information on the channel, providing information related to the youtuber's employment and education, family, and friends, introducing people from one's own family environment or external people, and exposing adults and children. In all cases, we found a medium-high effect size (from .20 to .57) with significant potency (1-β=1; 1-β=.99). Specifically, sharing personal data such as names, emails, addresses, and introducing people in the channels, was strongly related to self-concept, which would corroborate the third hypothesis.

In terms of the positive or negative self-description of the youtuber, we found that there was only a statistically significant relationship with intimacy concerning the introduction of other people in the videos, or the exposure of children. In other words, we presumed that youtubers in parenting vlogs were more likely to self-describe (positively or negatively) when other people were involved in their videos, or when they interacted with minors (with a mean effect size of .11 and .17 respectively) and a significance that could be extrapolated to other cases (1-β=.99). Therefore, in the remaining cases, the third hypothesis is discarded.

In the case of the youtuber's communication style, we once again found a statistically significant relationship with all the items related to intimacy. Maintaining a spontaneous, emphatic, and unique speech is directly linked to all the variables related to the intimacy of the youtuber, with medium-high effect sizes (between .25 and .50) and considerable sample potency (1-β=1). This means that the type of communication in parenting vlogs is part of their family intimacy. Here again, we corroborate the third hypothesis.

Finally, referring to the contents and topics of the channels, we found that, except for the youtuber's employment/education (intimacy variable), there was a statistically significant relationship between the family routine, interests, dreams and life projects of the youtubers and the intimate information shared (medium effect sizes between .15 and .38, and a considerable sample potency of 1-β=1 and 1-β=.99). Thus, the contents of parenting vlogs are especially intimate, also supporting the third hypothesis.

We found that there is a critical correlation between influencers' performativity and intimate content. As an example, to present themselves, they tried to provide as much information as possible about their life (names, family members' appearances, personal stories, etc.). It was also interesting that influencers' self-concept was reflected when other people were involved (e.g., talking about themselves positively or negatively when family members appear, or when they refer to their followers). Another aspect linking the performative character of parenting vlogs to intimacy was the communicative style. In these videos, spontaneity and emotion seems to be paramount. Particularly, the influencers' whole life is based on explaining to their followers what, how, when and where they experience life. And lastly, the topics addressed by the influencers fit their followers' claims from a family perspective and daily entrepreneurial activities. From this perspective, we considered the relevance of the descriptive results and correlations related to the previously introduced theories, in order to understand the intimate-performative phenomenon of parenting vlogs..

5. Conclusion, limitations, and future research

The study of intimacy and performativity on *YouTube* family channels has enabled the systematization of characteristics that determine the degree of exposure of intimate information in a new participatory, digital and mediated environment (**Androutsopoulos**; **Tereick**, 2015). An audio-visual typology that deals with contents related to parenthood from activities related to the upbringing of children and their daily routine to leisure activities, constructing a thematic genre reminiscent of the photogenic instantaneity of the *Polaroid*, that reproduces daily family life (**Vizcaíno-Verdú**; **Aguaded**, 2020). This genre, through the enhancement of daily tasks (**Elorriaga-Illera**; **Monge-Benito**, 2017; **Sibyl**, 2008), attracts a large following on *YouTube* (**Abidin**, 2017).

Having reviewed and compared the high number of subscribers and views in these scenarios, we consider that, as **Harwik** (2016) and **Driessens** (2013b) point out, family youtubers exploit the platform to guide their followers in a process of social loyalty that enables them to build a sort of celebrity capital. In this way, they consolidate their identity on the platform through virtual relationships established with their community, with whom they share common interests (**Flores-Vivar**, 2009).

Throughout the data collection process, we observed an evolutionary development of the main characters in the two channels, from absolute anonymity to celebrity (**Abidin**, 2018; **Elorriaga-Illera**; **Monge-Benito**, 2017; **Marwick**, 2015; **Senft**, 2013). In these cases, their expressive modes and their accounts of daily life, interests, dreams, and fears demonstrate an informative flow that intensifies with the videos (and the years), ratifying the reality media format that **Collins** (2014) suggested. This coincides with the progressive increase in their display of intimacy, since part of their success is related to their exposure of areas of life that formerly belonged to the private sphere.

Regarding the first and second research questions, these profiles are characterized by the frequent availability of content from their private lives that is posted continuously (**Rubio-Hurtado** *et al.*, 2022), mainly related to themselves and their family unit and friends. These sharing behaviors may be related to the search for new formats that appeal to their communities, impacting the monetization of their channels (**Elorriaga-Illera**; **Monge-Benito**, 2017; **Nottingham**, 2019). The youtuber-follower relationship can become so close that the latter often needs to delve deeper into the environment and lifestyle of these families. Thus, the degree of intimacy shown by these channels can be intentionally related to a request-fulfillment cycle to establish closer and more intimate relationships with their followers, as in the case of teenage influencers (**Marôpo** *et al*., 2019) and beauty vloggers (**Berryman**; **Kavka**, 2017; **Castillo-Abdul** *et al*., 2021). By showing the intimacy of their routine practices, these microcelebrities position themselves as accessible and real people with whom to establish a bond (**Raun**, 2018). In turn, family youtubers seem to consolidate these bonds to strengthen their self-esteem in parallel to their reputation and economic benefits (**Hearn**; **Schoenhoff**, 2016).

Recent studies indicate how common it has become to share the images of relatives, including minors, on social media platforms. This was observed within our sample, suggesting a practice associated with sharenting (**Holiday** *et al.*, 2022). As noted by **Nottingham** (2019), family youtubers seem to need content that is continuously updated, often compromising their privacy and the workload of minors.

Along the same line, it is worth noting the emergence of new possibilities and perspectives for the study of sharenting, where cases go beyond child exposure. Parenting vlogs emerge as new models for the expression of intimacy, where family members become the main characters and their relationships are reflected by the moments shared on video. These instants effectively become part of their online identity and generate a need to be continuously updated by creating and posting new content, validated through interactions that motivate parents to continue posting (**Cino**; **Demozzi**; **Subrahmanyam**, 2020). According to the definition of intimacy (**Raun**, 2018), it becomes evident that these channels continuously display both intimate practices (such as childbirth), as well as reflections and thoughts on future and past decisions in search for community reaffirmation and the construction of their online identity. **Ranjana-Das** (2018) explains how the commodification of intimate moments such as birth on *YouTube* turns mothers into neoliberal subjects who present curated versions of themselves for their followers. In this sense, it should be emphasized that, although the concept of networked self-expression and performativity (**Papacharissi**, 2011; **Busse**, 2017) is not new, its adaptation to *YouTube* and its model for content monetization has meant that boosting and maintaining the interest of audiences has become paramount. Therefore, the characteristics of parenting vlogs on *YouTube* are built on spontaneity and expressing a family self-concept through the exposure of daily life activities. In this scenario, thoughts, beliefs, suggestions concerning commercial products, as well as other people in their environment are introduced with several implications in terms of sharenting and other phenomena.

In terms of the relationship between the performative character and intimacy in these channels (third research question), we found a high relationship between the variables. This allowed us to understand there is a sort of familiar performativity in which intimate activities become the main content of these influencers' channels. In other words, sharing the routine, introducing people (adults and minors) from their daily environment, and including narratives related to dreams, projects, and thoughts, portray self-conceived family digital personas that give significance to their performative youtuber selves.

Although the cases presented are limited in terms of the geographic scope of the sample and analysis, the correlational statistical analysis, and the sample representativeness limit some of the factors necessary to extend the research to other international contexts. In this sense, we offer a starting point for understanding these family dynamics with a perspective of interest within social media related to the role of performativity and intimacy. *YouTube* parenting vlogs have become a consolidated genre of intimate performativity and one of the emerging trends in the social media environment. In addition, the structural aesthetics found on *YouTube* have moved to other memetic and audio-visual platforms such as *TikTok*, where this performative model seems to evolve, stimulating to contrast and deepen the representation of the self from the perspective of the family.

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Body and diet as sales pitches: Spanish teenagers' perceptions about influencers' impact on ideal physical appearance

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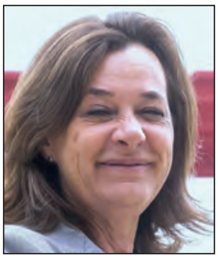

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Abstract

This project sits at the intersection of three axes: (a) influencers as the increasing focus of minors' attention and trust online, (b) sponsored content about eating habits and physical appearance produced by these influencers, and (c) minors' ability to discern and identify the persuasive intent of said content. The usefulness of analyzing the interplay of these three axes lies in the impact that consumption of this content has on minors' self-esteem and on the adoption of certain habits that can directly impact their personal well-being. For this reason, this project seeks to provide insight into the social imaginary that influencers' sponsored speech creates in minors regarding their physical appearance. To this end, a qualitative study with 12 focus groups of minors aged 11–17 years of age who reside in Spain was proposed. Notable among the key results was that the interviewees recognize that they primarily receive commercial messages about food and products related to physical appearance, such as makeup or clothing, from influencers; likewise, they are aware of persuasive tactics used on social networks, such as the construction of a perfect, aspirational world, which minors absorb and accept as part of the digital environment and end up incorporating into their behavior on social networks. This research aims to help demonstrate that teaching critical thinking is a long-term cultural investment that would make the citizens of tomorrow aware, engaged, and active.

Keywords

Influencer marketing; Influencers; Minors; Adolescents; Teenagers; Generation Z; Physical appearance; Food; Body; Social media; Social networks; Media literacy; Critical thinking; Perceptions; Youtubers.

Funding

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1. Introduction

For some years now, the effects of the use of social networks on minors has made a huge impact (**Livingstone**; **Blum-Ross**, 2020). One of the latest leaks of the *Facebook* team's private research highlights that simply consuming certain content on these platforms influences the mood of young people: more than 40% of *Instagram* users noted that the feeling of being unattractive began while using the app (**Milmo**; **Skopeliti**, 2021).

This study aims to focus attention on healthy lifestyles for children and adolescents, specifically their eating habits and physical appearance, two issues to which adolescents attach particular importance and which influence their self-perception, as highlighted in the results of the *Unicef Spain*'s *Opinion barometer of childhood and adolescence* [*Barómetro de opinión de la infancia y la adolescencia*] (*Unicef*, 2021). Children and adolescents generally have some understanding of health recommendations related to diet and physical activity, but the percentage of those who say they follow these recommendations is clearly lower, especially among those with lower purchasing power.

It should also be added that social networks and, by extension, influencers have become one of the main sources for finding information (*IAB Spain*, 2021). In the context of this digital age, the *World Health Organization* mentioned an infodemia, referencing the excess of information to which the individual is subjected on the Internet (*WHO*, 2020). Therefore, discerning content, knowing how to identify and select sources, and limiting the spread of disinformation, especially on issues that directly affect their self-esteem and well-being, have become fundamental skills for digital media consumption among children and adolescents, an audience that is vulnerable and still in their formative years.

Revelations such as the stories about *Facebook* and *Instagram* in September 2021 focus on the effect that the use of social networks has on adults and young people (**Milmo**; **Skopeliti**, 2021). Indeed, more and more research (**Coates** *et al.*, 2019; **De-Jans** *et al.*, 2021; **Lowe-Calverley**; **Grieve**, 2021; **Tiggeman**; **Anderberg**, 2020) has shown that influencers' social media posts affect users' choices, both in the perception of their body image and in their dietary patterns. Experts insist on the need to control and regulate the algorithms that choose and adapt which photos and videos a user sees according to their use, potentially creating a spiral of harmful content; others advocate for educating young people about how to navigate a world dominated by social networks, equipping them with the tools they need to make healthy decisions for themselves (**Milmo**; **Skopeliti**, 2021). Therefore, in line with *Unicef Spain*'s (2021, p. 52) recommendations to address children and adolescents' concerns and to promote the practice of healthy habits, this research seeks to approach the social imaginary that minors form on such important topics as nutrition and their physical appearance based on posts made by influencers in collaboration with brands, thereby appropriating these values.

2. Body and diet as persuasive arguments in influencer marketing

Although advertising investment in Spain saw a decrease of almost -18% in 2020 compared with the previous year, influencer marketing was the advertising modality that experienced the most growth along with native advertising (*Infoadex*, 2021). Influencers create high-quality aspirational content by getting a following similar to celebrities and famous people, which they monetize by promoting products (**Lowe-Calverley**; **Grieve**, 2021). For advertisers, they are attractive brand ambassadors, as they are effective in conveying authenticity (**Audrezet**; **De-Kerviler**; **Moulard**, 2020), credibility (**Djafarova**; **Rushworth**, 2017; **Lim** *et al.*, 2017), and confidence to consumers because they create a closer, more committed relationship with their followers (**Silva** *et al*., 2021). Under social cognitive theory (**Bandura**, 2001), it is assumed that influencers shape their followers' behaviors by being observed, by becoming symbolic models that can be imitated to achieve the same results. Moreover, this process is intensified because influencers are seen as "close friends" (**Meyers**, 2017), which reinforces the idea that anyone can attain their level of popularity (**Silva** *et al*., 2021), a feeling especially widespread among children and adolescents. The stronger the parasocial interaction with influencers, the more trustworthy and engaging their message will seem. Thus, it is most likely that their audience will follow their recommendations with the understanding that the message conveyed is more trustworthy and attractive, values that are then transferred to the products and brands these influencers sponsor (**Lim** *et al*., 2017).

It is important to note that, although there is no specific regulation in Spain regarding influencer marketing, some self-regulatory initiatives have been launched that aim for more ethical use. Since 2021, there has been a Code of Conduct for the use of influencers in advertising, developed by *Autocontrol* and the *Spanish Association of Advertisers* [*Asociación Española de Anunciantes* (*AEA*)], oversight that is necessary, in particular, with food brands since studies show that influencer marketing aimed at minors preferentially presents products with a high content of saturated fats, salt, and sugar (**Castelló-Martínez**; **Tur-Viñes**, 2020; **López-Bolás**; **Feijoo**; **Fernández-Gómez**, 2022; **Tur-Viñes**; **Cas-**

telló-Martínez, 2021). This exposure is troubling, as the placement of unhealthy foods in influencer posts has been shown to increase intake of these types of foods among children (**Coates** *et al*., 2019), thereby increasing the risk of childhood obesity, along with the emotional and self-esteem consequences that this entails (**De-Jans** *et al*., 2021). Likewise, in the context of food and fitness marketing, influencers' bodies become brand values to convey an ideal body image (**Powers**; **Greenwell**, 2016).

> A review of the cited literature come from English-speaking or Western European countries, with Spanish studies being anecdotal in nature and varied

Younger generations are especially concerned with their bodies, and advertisers know it. Thus, there are several studies that demonstrate the role of the body as effective advertising in the sponsored posts of influencers from the fitness world (**Silva** *et al*., 2021). Moreover, the greater the influencers' presence, the more engagement the content generates. These authors emphasize the need for future studies that analyze the role of followers of this sponsored content on social networks; hence, this study, which seeks to analyze the phenomenon of influencer marketing related to food and the body from the point of view of the imaginary of adolescents who follow such brand ambassadors, has been proposed. Therefore, the following research question arises:

RQ1. Do minors realize that influencers are drawing them to brands in the food and body care sectors?

The direct impact of the influencer lifestyle on eating habits (**Coates** *et al*., 2019; **De-Jans** *et al*., 2021) and on social network users' level of body satisfaction (**Lowe-Calverley**; **Grieve**, 2021; **Su**; **Kunkel**; **Ye**, 2021; **Tiggeman**; **Anderberg**, 2020) has been observed, most markedly among younger audiences. **Tiggeman** and **Anderberg** (2020) report that exposure to idealized images on social networks causes an increase in body dissatisfaction in both women and men, albeit with certain differences between the sexes. Men are especially affected by images of other men with bare torsos; a muscular body has come to be an element that can be exploited by influencer marketing (**Su** *et al*., 2021). **Brown** and **Tiggemann** (2016) compared the influence of *Instagram* images of celebrities versus those of unknown attractive peers on women's mood and body dissatisfaction. It was found that, in both cases, negative mood and body dissatisfaction increased on account of the influencer, whether celebrity or peer (**Chae**, 2018). **Lowe-Calverley** and **Grieve** (2021) concluded that idealized images of thin women result in body dissatisfaction among followers, regardless of the number of likes that the post receives. In regard to the impact of influencer marketing on minors' food choices, there is evidence to demonstrate that this persuasive method can be effective in promoting foods with low nutritional quality but not in promoting healthy nutrition (**Coates** *et al*., 2019; **Smit** *et al*., 2019; **De-Jans** *et al*., 2021). However, showing the negative effects associated with a high-fat, high-sugar diet on social media does play a role in reducing consumption of those products (**De-Jans** *et al*., 2021), but showing an athletic lifestyle does not necessarily encourage habits that are more beneficial to health. Given these findings, further study should be devoted to the beliefs that minors form about such issues that directly affect their self-esteem and that influence their choices, with the aim of using their critical competence to counteract this idealized, intentionally persuasive content. Based on this, a second research question arises:

RQ2. What perceptions do minors construct based on influencers' persuasive messaging about diet and the body?

On the other hand, much of the research about new media advertising directed at minors that was reviewed (**De-Jans**; **Hudders**, 2020; **Feijoo** *et al*., 2021; **Feijoo**; **Pavez**, 2019; **Hudders** *et al.*, 2017; **López-Villafranca**; **Olmedo-Salar**, 2019; **Ramos-Serrano**; **Herrero-Diz**, 2016; **Rozendaal** *et al.*, 2013; **Tur-Viñes**; **Núñez-Gómez**; **González-Río***,* 2018; **Van-Dam**; **Van-Reijmersdal**, 2019; **Van-Reijmersdal**; **Rozendaal**; **Buijzen**, 2012; **Van-Reijmersdal** *et al.*, 2017; **Van-Reijmersdal**; **Rozendaal**, 2020; **Vanwesenbeeck**; **Walrave**; **Ponnet**, 2017) highlighted the increasingly blurred line that differentiates what is entertainment content and commercial content, especially on social networks. Consequently, it is necessary to put particular focus on what minors process when they consume this content, which does not have a standardized format, though in many cases it depends on the context in which they are developed. When faced with such advertising content, advertising literacy based on not only a conceptual dimension but also a critical one becomes crucial (**Adams**; **Schellens**; **Valcke**, 2017; **Hudders** *et al.*, 2015; **Rozendaal** *et al.*, 2011). The importance of critical thinking in advertising literacy was observed by **McLean**, **Paxton**, and **Wertheim** (2016), who concluded that adolescents with low critical skills suffer a more negative effect upon seeing an idealized version of feminine beauty in conventional ads, an issue that becomes particularly troubling upon reviewing the results of the *EU Kids Online 2017–2018* survey, which revealed that Spanish minors between 12 and 16 years of age have the lowest levels of information navigation skills and critical assessment in Europe (**Smahel** *et al*., 2020). Thus, it seems appropriate to raise a third research question:

RQ3. Do minors activate their critical thinking when faced with the type of persuasive content published by influencers?

It is important to pay attention to the level of advertising exposure to which the minor is subjected through mobile phones, which have become the main device used to access the Internet (*IAB Spain*, 2021). An exploratory study on smartphone usage (**Feijoo**; **Sádaba**; **Bugueño**, 2020) shows that children and adolescents spend a large part of their time connected to platforms such as games and social networking apps, on which the level of advertising exposure is 14 minutes per hour of use, a level of consumption slightly higher than that of other types of media such as television. At times, advertising was even present in >80% of a minor's browsing time. Additionally, one of the common categories in the digital environment and on social media is food, drinks, and sweets, mostly unhealthy products and brands (**Alruwaily** *et al.*, 2020; **Coates** *et al.*, 2020; **Feijoo**; **Sádaba**; **Bugueño**, 2020).

A review of the cited literature on minors, influencer marketing, eating habits, and body image reveals that a majority of the studies come from English-speaking or Western European countries, with Spanish studies being anecdotal in nature and varied, focused on influencers' effect and/or the analysis of content published by influencers, without considering the minors' perspective (**Castelló-Martínez**; **Tur-Viñes**, 2021; **Fanjul-Peyró**; **López-Font**; **González-Oñate**, 2019; **Feijoo**; **Fernández-Gómez**, 2021; **Fernández-Gómez**; **Díaz-Campo**, 2014; **González-Oñate**; **Martínez-Sánchez**, 2020; **Tur-Viñes**; **Castelló-Martínez**, 2021). This study seeks to fill this gap and go beyond the suitability of the published content and the study of the effects influencers' lifestyle posts have on minors. It considers minors' reactions, processing, and beliefs as well as the imaginary formed around these issues, which is necessary to understand in order to develop proper training and debunk myths and misinformation. The desired outcome is that this new type of user would be able immerse themselves in the consumption of advertising content with skepticism and restraint. In short, as **Barbieri** (2020) indicates, teaching critical thinking is a long-term cultural investment, making the citizens of tomorrow aware, engaged, and active.

Consequently, the main objective of this research is to understand the impact branded content posted by influencers on social networks has on Spanish minors' (between 11 and 17 years of age) perceptions of habits that affect physical appearance. The aim is to study what they think about these issues that can directly affect both their physical and mental well-being modeled on the content posted by certain brand advocates.

3. Methodology

A qualitative study of an exploratory nature was proposed through the development of focus groups of minors between 11 and 17 years of age who reside in Spain. A qualitative approach was chosen because one of its great advantages is that participants have a voice and provide insight into the "what" and "how," yielding information on decisions, trajectories, and degree of participation in the digital environment. In short, qualitative strategies are the best way to become immersed in the day to day of the participants (**Silverstone**, 2005), achieving an inclusive approach that provides insight into, in this case, the imaginary that minors form around the content they receive at the hand of influencers.

The minors were moderated by the researchers who make up this work team, specialized in the topic under discussion and trained in moderation skills, because it was essential to create a relaxed environment to promote interaction between the participants and ensure that the discussion focused on the subject at hand (**Stewart**; **Shamdasani**; **Rook**, 2007).

The focus groups were designed in accordance with a semistructured discussion guide, with the aim of addressing the same issues in all groups but allowing for some flexibility. Because they were minors and because of the moderator's difference in age, the dynamization began with a detailed explanation that the focus groups were not a test, so there were no correct or incorrect answers, judgment, or evaluations, given that everything they discussed would be very enriching for the researchers. Because of the pandemic, we chose to hold the focus groups virtually (in *Microsoft Teams* and *Zoom* rooms), so permission to record the session was always requested (with the signed consent of their parents or legal guardians), also explaining that the recordings were exclusively for scientific use, to transcribe in detail what had been discussed. This first segment, although it did not provide information about content, was crucial to gaining the minors' trust and making them feel comfortable to talk sincerely about their routines and preferences on social networks.

After this introduction segment, between five and ten minutes of conversation were dedicated to understanding what perceptions they had about social networks, taking the first steps toward understanding their relationship with these platforms: which ones they use, how much time they spend on them, how they rated them, etc. Once this was done, we entered into the central part of the research by asking what type of people they follow on social networks, turning the conversation towards the influencers they follow to gain insight into the relationship they have with these influencer profiles, why they follow them, and what level of credibility and trust they elicit. Finally, we also wanted to understand minors' point of view on the role of influencers as brand collaborators and their reaction with respect to it. It is important to clarify that the minors' statements about influencer marketing and physical appearance do not come from suggested questions on the subject but rather arose spontaneously and naturally in the dynamic of the focus groups. Upon reviewing transcripts of the conversations, the recurrent presence of this unexplored topic was detected in the digital discourse of preteens and adolescents. Hence, we decided to analyze this in the research in greater detail and in an exploratory way.

> They perceive that the industries that collaborate most with influencers are the fashion, makeup, food, and technology (apps, electronic devices, etc.) sectors

Table 1. Connection between the research questions and the structure of the questionnaire that guided the focus groups

Research questions	Focus group discussion guide
Minor's perception of the role of influencers as brand ambassadors (RQ1 and RQ2)	On your social networks, do you follow famous people/influencers? Whom do you follow? What is an influencer to you? Relationship with brands: Have you seen the influencers you follow promote products on their social networks? Why do you think influencers promote products and brands? What do you think of influencers promoting products and brands while you are viewing their content?
Minors' critical analysis in the face of influencer marketing (RQ3)	Why are you following influencers? Have you ever seen an influencer talk about a new product and then informed yourself about what they said, or is the information they provide sufficient? Do you trust what the influencer says on their social media? Why? Do you think influencers exaggerate or modify things from their experience to make their posts more attractive?

Each focus group lasted approximately 50 minutes, and they were held between April and June 2021.

Qualitative data were obtained through a thematic analysis in *NVivo* (**Boyatzis**, 1995). The research questions and topics included in the focus group script guided the coding categories established.

3.1. Characteristics of the sample

Because it was a study of a qualitative nature, the sample was nonprobabilistic (**Bernal**, 2010). Thus, 12 focus groups, in which a total of 62 students from different parts of Spain participated (5–6 members per group), were conducted.

The sample was recruited through schools. Two filter criteria were defined for the establishment of the focus groups:

- the minor's age: establishing four categories according to academic year: 6th grade, the first cycle of Spanish secondary school, the second cycle of Spanish secondary school, and the last 2 years of high school
- the socioeconomic profile of the educational center, determined by its type (private, charter, or public) and by its geographical location, which serves as a previous indicator of the socioeconomic level of the households from which the minors come (**Andrino**; **Grasso**; **Llaneras**, 2019). According to the last segmentation criterion, schools were differentiated between high (>€30,000 in income), medium (€11,450–€30,350) and low (less than €11,450) socioeconomic levels, according to statistics from the *Spanish National Statistics Institute* (**Andrino**; **Llaneras**; **Grasso**, 2021). This double segmentation was established because the minors' age and the socioeconomic status of the family were believed to influence their level of digital critical competence (**Smahel** *et al*., 2020). Efforts were also made to maintain, as far as possible, a ratio of men and women in the composition of the working groups.

Thus, in the first place, schools throughout Spain with these three profiles (private, charter, and public) were contacted according to their geographical location to meet the indicated filter variables. The project was explained to the directors of the centers and/or those responsible for the classes, who served as intermediaries to get in contact with the minors' families, the ones who ultimately did or did not authorize participation in the research. Establishing contact in two steps slowed down the sample selection process, but this intermediation was considered necessary to target the student's profile and avoid cold calling, which in research with children is not very effective.

Table 2 presents the distribution of the focus groups according to the two filter variables defined.

Table 2. Total number of focus groups developed

Focus group		Socioeconomic profile of the center			
		High	Medium	Low	Total
Academic year	6th grade	1	1	1	**3**
	First cycle of Spanish secondary school	1	1	1	**3**
	Second cycle of Spanish secondary school	1	1	1	**3**
	Last 2 years of high school	1	1	1	**3**
	Total	4	4	4	12

In the end, 17 schools –8 private/charter, 9 public; 6 high socioeconomic group (SEG), 8 medium SEG, and 3 low SEG– that were located in different parts of Spain, managing to represent the whole reality of the national geography (the North, the South, the Center, the Levant, and the Islands) lent their cooperation. The centers connected us to 62 students, who made up the sample that ultimately participated in the focus groups and that was distributed as follows: 25 were boys and 37 were girls; according to class, 16 minors were in 6th grade (11–12 years of age), 13 were in the first cycle of Spanish secondary school (12–14 years of age), 18 were in the second cycle of Spanish secondary school (14–16 years of age), and 15 students were in their last 2 years of high school (16–17 years of age); according to the socioeconomic level of the neighborhood in which their school was located, 20 minors came from a high SEG, 22 came from a middle SEG, and 20 came from a low SEG.

The nature of this study involves a series of ethical considerations that must be taken into account, in particular regarding the participation of minors in fieldwork. Therefore, we always had express parental authorization, supervised by the ethics committee of the university that financed this research, which also supervised and approved the report of this research project.

4. Results

4.1. Relationship with brands

First, it is necessary to point out a distinction used by the minors interviewed to classify influencers that affects how they perceive the brand messages influencers can spread as ambassadors: on the one hand, there are those who owe their popularity to the profession they had before social networking, such as singers, actresses, or athletes, and, on the other, those who got their start and developed as content creators on social networks. Whereas the former tend to be seen by students as idols, since they believe their life story and experience validate their online activity, they are, a priori, more skeptical of the latter:

> "A person who is expert in something, for example, if someone is a tennis player and you play tennis, recommends, "Buy this racket because it is the best," in that case I might trust them, but as an influencer, a person who lives on social networks and who has to do that sort of advertising, well, no" [focus group (FG) 7, girl, first cycle of Spanish secondary school, middle SEG].

As can be seen from this reflection, the interviewees assume that brand promotion is part of their job for those famous for their life on social media; on the other hand, when presented with posts published by celebrities who are also famous outside of social networks, they were more confident and relaxed.

> "I do follow people who work as influencers. For example, in the case of Elsa Pataky [...] who is an actress and has an amazing body, she's of a certain age now... she has gone through three pregnancies and everyone knows what having a baby entails... and she's remarkably well preserved. So, in the case of diets, well, I understand that she would be an idol ... she has no reason to lie to me, I don't think they would pay her to do it. I wouldn't say that María Pombo is lying to you, either, but it turns out that now, with the new protection regulations, the one about advertisements, you have to post when it's advertising" (FG6, girl, last 2 years of high school, high SEG).

In addition, they perceive that the industries that collaborate most with influencers are the fashion, makeup, food, and technology (apps, electronic devices, etc.) sectors. These are markets in which the minor acquires the role of buyer and primary consumer and for which brands, especially makeup brands, have created specific product lines that appeal to the small out-of-pocket expenses that adolescents can afford with their resources, often purchased compulsively.

> "Yes, I did. I bought makeup. I had seen a video that spoke very well of it and I bought it. It was cheap and it went a long way" (FG12, girl, last 2 years of high school, medium SEG).

Likewise, although in a less pronounced way, even from the age of 12 years, they are already target audiences of food products that trigger concerns over physical appearance:

> "I also see a youtuber who is always promoting *Myprotein*, protein shakes to get in shape" (FG11, boy, 6th grade, low SEG).

In this scenario, signaling a sponsored post with the hashtag #Ad influences the imaginary that the minor formed about the message's level of credibility differently depending on whether it comes from one type of influencer or another.

> "I follow Rafa Nadal and [...] he has super dark skin, well now he has a collaboration with *Cantabria Labs*, which makes sun creams, and I know he means it." (FG6, girl, last 2 years of high school, high GSE).

In any case, for the participants, the presence of the hashtag #Ad, or any other such signalling, is key in them viewing the content as advertising and not so much as an exercise in interpretating the message:

> "Interviewer: What indicates to you that they are promoting something?
>
> Interviewee 2: They usually say so.
>
> Interviewee 5: Many times influencers make videos with the clothes they have been sent, and they say I love these comfortable, stylish pants from... from this brand.
>
> Interviewee 4: from a brand and they label it. And they say, 'Go over there that… that there is…' […] and there is a discount code in my name.
>
> Interviewee 5: or there is a drawing" (FG5, girls, second cycle of Spanish secondary school, high SEG).

Promotional techniques and discounts are resources that capture their attention and intention. In any case, it is important to note that minors are not repulsed by influencers acting as brand ambassadors provided they have a genuine connection to that brand and it fits in with the lifestyle they maintain.

> "There are influencers whom I do not feel have credibility, because all of the sudden, they advertise one thing, then another... But if you then see another person who, for example, you see that they have been using a cream and then they advertise it, then okay" (FG6, girl, last 2 years of high school, high SEG).

4.2. Perceptions built on physical appearance

The minors interviewed recognize that most of the collaborations they perceive between influencers and brands come from the fashion, makeup, and food sectors and that they are directly related to the cultivation of an image and physical appearance. It was found that the imaginary formed by the students who participated in this study –aged between 12 and 17 years of age– regarding appearance, based on this exposure to sponsored content, revolves around external care, looking good outside, and following the trends set by influencers. Thus, one of the key words from this analysis most mentioned by the participants in the focus groups, especially by the female audience, was "makeup."

> "I have a friend who follows Milly Bobby Brown, an actress who works in *Stranger Things*. She's not an influencer, but she is a little like one, because she has her social networks and she has created a makeup line and then my friend became convinced that it was good and bought the whole line" (FG2, girl, first cycle of Spanish secondary school, high SEG).

The clothes and trends shown by influencers is another topic that draws interviewees of all ages and social classes, so much so that they take influencers' advice and suggestions as an example to inspire aesthetic taste:

> "If I follow someone it is because I like the way they dress, their clothes, and I am interested in their life... then suddenly within two months, I no longer care, and I stop following them" (FG6, girl, last 2 years of high school, high SEG).

However, in conversations with older minors (last 2 years of high school) other deeper and more weighty concerns begin to appear, such as social pressure, body worship, eating disorders, or the need to present the appearance of perfection on social networks. These are reflections that arise in the older profiles of minors when they consume the material influencers post; these thoughts do not really go unnoticed and impact them.

> "Kylie Jenner who is an important girl, very famous, edits her photos and makes a reality that doesn't exist, then in those of us whom it reaches it creates discomfort in ourselves because we do not look like them" (FG9, girl, last 2 years of high school, low SEG).

In particular, the female audience between 15 and 17 years of age confesses that the force of this constructed reality pressures them to some extent, although they are aware that influencers present a retouched world:

> "Interviewee 3: They create a perfect body that is not normal.
>
> Interviewee 1: and that in the end it normalizes a body that very few people have... and that creates anxiety disorders and that type of thing, well, not anxiety, anorexia, sorry" (FG9, girls, last 2 years of high school, low SEG).

4.3. Is critical exercise perceived among the minors interviewed?

Minors face an increasingly hybrid scenario in the context of social media. Recognizing the origin and intentionality of the content becomes key in correctly managing the impulses received. Thus, this study sought to analyze what interpretations students make when faced with content posted by influencers. It is relevant to verify that minors have established in their imaginary the assumption that these opinion leaders build a world and speech for social networks, as if they were fictional characters but with the difference being that they "operate" in a real context.

> "I have a love–hate relationship with social networks, [...] and it's that on *Instagram* it's all appearances and that's better to realize that, because you see influencers with a perfect body, with a face without pimples, and many people compare themselves with that and we have to keep in mind that it's not real" (FG5, girl, second cycle of Spanish secondary school, high SEG).

The students interviewed, mainly the older ones, accept that what influencers publish about their routines is distorted, since they almost always show their nice and attractive side, and moreover, they are aware of the use of the aspirational appeal that celebrities use to keep the interest of their audience. Likewise, minors also seem to be clear about the consequences of a "naive" exposure to influencers' discourse, a stance they believe is key for social networks not to be "toxic":

> "Perhaps everyone wants to be like María Pombo because it seems that she has the perfect life, but we have to see that María Pombo's life is not like that. That's the first thing before following an influencer or anyone on *Instagram*... you have to know that the information provided will not always be 100% true" (FG6, girl, last 2 years of high school, high SEG).

Therefore, there is an exercise in questioning the content posted by influencers; moreover, if the content is of interest to them, they often evaluate it in much greater depth and more analytically, something characteristic of young profiles and prosumers:

> "there was an influencer who said 'I love this makeup' and was wearing it [...] And then I got a good look and she was using a beauty filter, too. I was very surprised because if she was saying that the makeup suited her well, why was she using the filter?" (FG5, girl, second cycle of Spanish secondary school, high SEG).

Also, some profiles of students (last 2 years of high school and high SEG) went further in their questioning and pointed out that certain products and services, especially those related to the food sector, should not be promoted by influencers:

> "Being told: 'Ah, check out this really cool spread' or 'it is good to do intermittent fasting.' There are things that I believe, frankly, should not be directly promoted" (FG6, boy, last 2 years of high school, high SEG).

It is interesting to note that, even though minors are aware that influencers present a sweetened vision of their lives, this is not sufficient reason for them to withdraw their support; what is more, influencers continue to be their models for certain content related to fashion and cosmetics:

> "If I like how a girl dresses and she endorses clothes, [...] and I like the clothes, well, I follow her because I like to see how she dresses, that there are new things, also because I like her style, I like what she does. Although she has a fake life and all, I also like her content" (FG2, girl, first cycle of Spanish secondary school, high SEG).

From their statements, it can be deduced that for minors there are other reasons, beyond authenticity, to give and maintain their support for influencers, such as the level of entertainment that they provide or the level of affinity with the content and topics that they inspire. Likewise, it appears that the interviewees assume that influencers build a virtual world that is "perfect and appearance-based" and accept it as part of the game. Moreover, the older minors recognized this need to maintain parasocial relationships with their opinion makers, since they feel that "everyone has to have someone to follow" (FG6, girl, last 2 years of high school, high SEG), so much so that they tend to imitate and incorporate into their lives a tendency to divide their digital presence, activating two profiles on each social network –especially on *Instagram*– one for their more public life, which they update more and on which they accept all kinds of acquaintances, and another more private, reserved for more private posts and that is accessible to their closest circle of friends.

> "On the main account, I am followed by more people, family, people I know, friends of friends, and then, the secondary account, which we also call a "fail account," well, the most personal version of me, on which I am mostly followed by the closest friends I know. And there I post, well, personal things from my life" (FG5, girl, second cycle of Spanish secondary school, high SEG).

In short, the interviewees are aware that the influencer world builds an attractive reality for the audience; however, certain minor profiles—the older ones—appreciate and look at profiles and accounts of personalities who stand out for claiming naturalness and sincerity, showing the less pleasant side of their lives, but who a minor questions less.

> "I do not usually follow people because of the shoes they wear or the color they dyed their hair, I [...] usually follow someone because of what their character is like, their emotions. Because I see people who, although a lot of criticism is thrown at their way, keep going forward ... they make videos explaining to us why this, why the other [...] That type of person, with that personality, well, I'm passionate about, and I like how they are, and that's why I usually follow them" (FG3, boy, second cycle of Spanish secondary school, low SEG).

The interviewees confirmed that it helps them to see how this profile of influencers normalizes certain problems of their age, by sharing them and making them visible. However, it must be kept in mind that their statements, almost always on sensitive issues (self-esteem, for example), are based on their own self-diagnosis, on their own sensations and perceptions, which can create some confusion and suggestions among adolescents, also due to that greater receptivity to this type of content. Table 3 summarizes the main arguments put forward by minors in the focus groups about their perceptions of influencer marketing and its impact on their concept of image and physical appearance:

Table 3. Main findings recorded after conversations with minors

<table>
<tr><th colspan="4">Influencer</th><th></th></tr>
<tr><td colspan="2">Expert (due to influencer job)</td><td colspan="2">Native in RRSS (influencer)</td><td rowspan="4">Relationship with brands</td></tr>
<tr><td>Clothing</td><td>Food</td><td>Makeup</td><td>Technology</td></tr>
<tr><td colspan="4">Primary purchaser</td></tr>
<tr><td colspan="4">#Ad: They relate it with the job of "influencer;" key in differentiating whether or not the message is advertising; inspires mistrust but it is accepted.</td></tr>
<tr><td colspan="2">Attention to external aspects
(clothes, style, makeup)</td><td colspan="2">Attention to more internal aspects
(anorexia, cellulitis, use of filters)</td><td rowspan="2">Interest in topics of diet/body</td></tr>
<tr><td colspan="4">- Age +</td></tr>
<tr><td colspan="2">Awareness of a constructed world vs. idealized</td><td colspan="2">Profiles that show "real experiences"
(psychological problems, disorders, insecurities)</td><td rowspan="4">Content questioning</td></tr>
<tr><td colspan="4">Parasocial relationship: "everyone has to have someone to follow"</td></tr>
<tr><td colspan="2">Assumption that perfection is part of the game</td><td colspan="2">Visibility and normalization</td></tr>
<tr><td colspan="2">Imitation (false accounts)</td><td colspan="2">Risk perception</td></tr>
</table>

5. Discussion and conclusions

> Even though minors are aware that influencers present a sweetened vision of their lives, this is not sufficient reason for them to withdraw their support

The value of this research lies in addressing the exposure of adolescents to commercial content about food and body worship that is generated by influencers on social networks, but from the perspective of the minors themselves, taking into account their perceptions and concerns and not the effect generated on their behavior (**Coates** *et al.*, 2019; **De-Jans** *et al.*, 2021; **Lowe-Calverley**; **Grieve**, 2021; **Tiggeman**; **Anderberg**, 2020; **Su**; **Kunkel**; **Ye**, 2021). Thus, it was possible to verify that the promotion of products and services related to food and care of physical appearance are present in a minor's imaginary: the interviewees spontaneously confirmed primarily receiving commercial influences on food and products related to the care of their physical appearance, such as makeup or clothing, on social networks.

Analyzing their statements, it is concluded that the adolescents interviewed, especially the older ones (second cycle of Spanish secondary school and last 2 years of high school), are aware of the influence and effects that these posts promoting a world with a perfect aesthetic can have on their habits and behaviors. Moreover, they assume that influencers build an ideal world with the aim of exploiting the aspirational relationship created between follower and celebrity as a persuasive tactic. However, it seems that, in their critical exercise, they relativize this appeal by accepting exaggeration and superficiality as part of influencers' content and also as something characteristic of social networks, thus tending to incorporate it into their own digital habits. A tendency was found among minors to have two separate accounts on the same social network, one as a "display" for which they accept contacts from their different circles (family, friends, and school) and on which they take great care in what they publish, especially photos, and another more personal one, on which they have their closest friends and show themselves more naturally. This could be a consequence of the fact that, in effect, for adolescents, influencers are symbolic models to imitate (**Bandura**, 2001), as well as being seen as "close" (**Meyers**, 2017), values that are also transferred to the products and services that they endorse (**Lim** *et al*., 2017). The interesting thing is that the minors interviewed are aware of the parasocial relationship (**Silva** *et al*., 2021) that they maintain with the influencers, which demonstrates a certain critical exercise; however, the adolescents did not delve into a greater questioning of the moral and ethical implications that this double role entails in their digital life (**Adams**; **Schellens**; **Valcke**, 2017).

It should be noted that certain differences were observed in the minors' statements according to the age and socioeconomic level of the focus group. Though inconclusive, as study continued to be deepened along these lines through quantitative methodologies, it was found that the most elaborate reflections by adolescents on the effects of being exposed to sponsored content related to food and body care came from older profiles (second cycle Spanish secondary school and last 2 years of high school) and from high socioeconomic groups.

As a result, minors also view the commercial role as part of the essence of an influencer, especially those who have developed their career as content creators in social networks. The credibility attributed to them as brand ambassadors varies according to whether or not they are considered "experts" in the product or service they promote. However, their ability to recognize the persuasive intention of these publications often depends on the presence of some signals, such as the hashtag #Ad, rather than their ability to interpret, as indicated by previous research on digital advertising and minors (**Feijoo** *et al*., 2021). Thus, on many occasions, especially when faced with those celebrities who owe their popularity to their previous profession, they are not able to recognize product placement if it is not marked as such, since they do not associate it with a collaboration of self-interest but rather see it as a genuine recommendation which they trust.

This research offers some lines of thought and work that are not intended to be conclusive, given the limitations implied by the qualitative method, which precludes making general conclusions, both because of the sample size, and because it was decided to approach the topic of discussion based on the perceptions and interpretations of the adolescents. Therefore, future lines of research may consider the analysis of this phenomenon from a quantitative perspective that explores the role of critical thinking in the moral and ethical values that influencers transmit to adolescents as symbolic models to be imitated, as well as the need to continue analyzing the influence of sociodemographic variables of households on the critical capabilities of the minor to mediate with the content they consume through social networks.

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Mobile instant messaging techno-stressors: Measurement, dimensionality, and relationships with type of usage

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Abstract

Increasingly popular mobile instant messaging (MIM) apps allow users to interact anytime and anywhere with different purposes, such as coordinating work-related issues, staying in touch with people they love, or passing the time. But recent research suggests that MIM may create excessive demands on people and become a source of technostress. For example, users may experience communication overload, invasion of their face-to-face activities, pressure to respond to messages with urgency, or ambiguity regarding the intention or tone of their interactions. Building on these ideas, we develop a specific, multidimensional measure of MIM technostress and explore how it relates to different uses. To do so, we use survey data from a diverse sample of 1,259 residents in Spain. Exploratory and confirmatory factor analyses conducted on different halves of the sample supported a four-dimensional, second-level construct of MIM stress. Furthermore, structural equation model results suggest that not all uses are equally associated with MIM stress. Relatedness and intimacy uses were not positively related to MIM stress or any of its dimensions. Conversely, work uses, coordination of social activity, and even passing the time were positively associated with all techno-stressors. We discuss our findings with an eye toward promoting healthy use of MIM apps.

Keywords

Mobile instant messaging; Mobile instant messaging uses; Technostress; Techno-stressor; Overload; Invasion; Urgency; Ambiguity; Measurement; Scale.

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1. Introduction

Over the last few decades, researchers from a variety of disciplines have taken an interest in the field of technostress, briefly defined as stress triggered by interaction with computer-based technologies (**Tarafdar**; **Cooper**; **Stich**, 2019). A significant portion of published studies have placed special emphasis on technostress in the workplace and showed concern about its adverse outcomes (see **Fuglseth**; **Sørebø**, 2014; **Tarafdar**; **Tu**; **Ragu-Nathan**, 2010). When dealing with information and communication technologies (ICTs) in general, workers may evaluate some of their characteristics as threatening or damaging, which turns these characteristics into techno-stressors. It is important to correctly identify techno-stressors because they are placed early in the technostress process, and they often lead to strain. For example, *overload* is the feeling that technology forces users "to work faster and longer" and "deal with excess information and features," *invasion* relates to perceptions that 'anytime, anywhere' ICTs make users' personal lives more permeable to work-related issues, *complexity* refers to perceived lack of skills to properly integrate the technology into their work, *insecurity* deals with the idea that ICTs threat their job stability, and *uncertainty* connects with the demands of having to adapt to changes and upgrades in ICTs (**Tarafdar**; **Cooper**; **Stich**, 2019, p. 3; **Tarafdar** *et al*., 2007, p. 315).

Outside the work setting, techno-stressors and the larger technostress process can be qualitatively and quantitatively different. For example, people are not equally forced to integrate technology into their personal lives, and threats to job security are less relevant sources of stress in private uses. In addition, different technologies with specific characteristics may involve the perception of different techno-stressors. Given the extensive use of 'anytime, anywhere' MIM apps for work and personal life, we think a more detailed examination of their role in the technostress process can provide important insights and facilitate further research on its antecedents, relevant coping strategies, outcomes, or even design-related aspects to alleviate technostress (see **Tarafdar**; **Cooper**; **Stich**, 2019). Some preliminary qualitative findings do suggest that MIM-specific *overload*, *invasion*, *urgency of response*, and *ambiguity* may induce technostress in personal and professional contexts (**Ardèvol-Abreu** *et al*., 2022).

Drawing on our and others' previous research, this study contributes to the current debate about technostress in two important ways. First, we address the call for "context-specific studies […] entailing specific types of technologies" (**Tarafdar**; **Pullins**; **Ragu-Nathan**, 2015, p. 104) by developing and validating a multidimensional, MIM-specific measure of technostress. This measure looks beyond the organizational context and includes more general demands arising from personal uses, which may be useful in further studies on MIM stress. Second, based on the idea of stress as a changing relationship between the person and its environment (**Lazarus**; **Folkman**, 1987), we explore if and how different uses of MIM trigger the stress process through different techno-stressors. Only with a sound knowledge of the MIM techno-stressors and their relationships with specific uses will it be possible to develop effective strategies for minimizing this specific source of stress.

2. MIM-specific techno-stressors

The technostress process involves the relationship or 'transaction' between the individual and their technological environment, and results from perceptions of imbalance between the demands posed by a given technology and their "resources or ability to cope with those demands" (**Quine**; **Pahl**, 1991, p. 59; see also **Folkman**; **Schaefer**; **Lazarus**, 1979; **Tarafdar**; **Cooper**; **Stich**, 2019). According to this transactional and systemic approach, technostress cannot be directly observed or measured. What is observable is an "interdependent system of variables" that includes, among others, technology environmental conditions, techno-stressors, coping responses, and a variety of short- and long-run outcomes (**Lazarus**; **Folkman**, 1987, pp. 142-143; **Tarafdar**; **Cooper**; **Stich**, 2019). As we shall see below, the first two elements are particularly relevant for this study.

Technology environmental conditions are events or characteristics of technology –for example, technology-related interruptions, mobility, or ubiquity– that "have the potential to create a demand in the individual" (**Tarafdar**; **Cooper**; **Stich**, 2019, p. 10). When an individual interacts with a certain technology and appraises some of its characteristics as threatening, these become techno-stressors. Techno-stressors may subsequently activate some forms of coping and lead to negative outcomes (strain) (**Ayyagari**; **Grover**; **Purvis**, 2011).

Against this background, MIM-specific stress can be defined as stress that individuals experience due to their interaction with MIM apps. Indeed, a recent qualitative study (**Ardèvol-Abreu** *et al*., 2022) found four main techno-stressors associated with MIM use: *overload*, *invasion*, *urgency*, and *ambiguity*. First, MIM users may experience feelings of *overload*, which may resemble to what **Tarafdar** and colleagues (2007) defined as techno-overload in their general model of technostress: "Situations where ICTs force users to work faster and longer" (2007, p. 315). From a proxemic perspective, **Shin**, **Seok**, and **Lim** (2018) referred to this by describing "the territory" of MIM as s "too crowded" space: Some users may perceive that they need to deal with an excessive number of contacts and group conversations, that the stream of messages and notifications is unmanageable, or that they are not able to "keep [their] MIM applications clean" (p. 8). Another exploratory study on WhatsApp use and wellbeing found that engaging with many one-on-one MIM conversations is positively associated with a single-item measure of perceived stress (**Blabst**; **Diefenbach**, 2017).

Second, MIM technology may in some instances facilitate the *invasion* of one's face-to-face, offline spaces, which can happen not only when users deal with work-related issues outside of working hours, but also when MIM interactions get in the way of their daily routines. In the realm of social media, previous studies have identified invasion (e.g., when individuals have to "sacrifice their leisure time to remain current on the latest developments in their communities or networks") as a major stress-inducing factor (**Bucher**; **Fieseler**; **Suphan**, 2013, p. 1656; see also **Tarafdar** *et al*., 2007). More relevant to the present work, **Lee**, **Lee**, and **Suh** (2016) found that work-related MIM interactions after working hours sometimes create stress because they associate with certain techno-stressors (e.g., perceived social insecurity, invasion of life, and work-home conflict) and lead to technology-related exhaustion and, indirectly, lower productivity.

Third, some characteristic of MIM apps (last seen, read receipts) may fuel feelings of *urgency* due to others' (and self-) expectations of quick response, which in turn may associate with increased perceptions of stress (see **Blabst**; **Diefenbach**, 2017). This is in line with the qualitative evidence presented by **Karapanos**, **Teixeira** and **Gouveia** (2016): WhatsApp creates expectations of immediacy while providing "limited cues regarding one's availability to respond," which sometimes leads to conflict and other negative outcomes (p. 894).

Fourth, technology-induced ambiguity (for example, role ambiguity at work) has been previously identified as a major techno-stressor and a predictor of strain (**Ayyagari**; **Grover**; **Purvis**, 2011). In the context of this study, MIM *ambiguity* is more specifically defined as the "lack of human presence" and reduced non-verbal cues, which sometimes make it harder to understand the tone and intention of MIM-mediated conversations (**Ardèvol-Abreu** *et al*., 2022). Based on these arguments and empirical findings, we posit the following hypothesis:

> H: MIM stress is a second-order construct that consists of the following first-order dimensions: *overload*, *invasion*, *urgency*, and *ambiguity.*

3. MIM uses and techno-stressors

Not everyone uses MIM in the same way or with the same goals. As with any other media, MIM users are "active, discerning, and motivated" when interacting with the app (**Quan-Haase**; **Young**, 2010, p. 351; see also **Rivas-Herrero**; **Igartua**, 2021). This view of the media as means to satisfy specific needs is at the heart of the Uses and Gratification Theory (U&G). For example, when a person wants to involve and satisfy their basic need for relatedness, they may resort to instant messaging and interact with someone they love (**Karapanos**; **Teixeira**; **Gouveia**, 2016; **Reeve**, 2009).

Previous research has adopted the U&G theoretical approach to explain gratifications obtained from the use of MIM. For example, a highly cited study by **Quan-Haase** and **Young** (2010) compared uses of instant messaging with uses of Facebook and found a similar pattern of gratifications obtained from both types of media. The comparison, however, relied on an earlier work about motives for chatting on the instant messaging tool ICQ ("I seek you"), which used survey data from 1999 (**Leung**, 2001). ICQ was mainly a desktop instant messaging software at the time, and therefore one cannot readily extrapolate findings from ICQ to modern mobile messaging. A more recent qualitative study on WhatsApp uses and motivations among teenagers (aged 12 to 17) provided a catalogue of usages associated with private (one-on-one) and group interactions. These include "talking and meeting up with friends and family," "catching up with lessons and homework," "playing videogames," or "humor," among others (**Costa-Sánchez**; **Guerrero-Pico**, 2020).

Among adults, the most common use of MIM seems to be for *relatedness*, *intimacy*, and *social interaction* purposes, which connects with the basic psychological need of relatedness (**Ardèvol-Abreu** *et al*., 2022; **Reeve**, 2009). Other frequent uses of MIM among adults include *work, business, and study*; *political and civic*; *domestic and other non-work commitments*; and *pastime and entertainment* (**Ardèvol-Abreu** *et al*., 2022; see also **Pont-Sorribes**; **Besalú**; **Codina**, 2020). With this variety of usage types in mind, our departure standpoint is that different uses of MIM will associate with MIM stress differently –both when considering the overall measure of MIM stress and its component dimensions. This is because each use tends to have a particular pattern of demands and constraints and may therefore be more likely to associate with certain techno-stressors and not with others. For example, *work- and study-related uses* are probably more likely to trigger feelings of invasion than are *political and civic uses*, while *social interaction uses* are presumably more connected to *ambiguity* than are *domestic and other non-work commitments*. Given the large number of potential associations between MIM uses and MIM techno-stressors, we pose two open research questions rather than directional hypotheses:

> RQ1: How do different uses of MIM relate to the overall measure of MIM stress?
>
> RQ2: How do different uses of MIM relate to the component dimensions of MIM stress –i.e., MIM techno-stressors?

4. Methods

This study uses survey data from a larger, two-wave study on individual and societal impacts of mobile and internet technologies funded by the Universidad de La Laguna. The research team relied on the literature discussed in the previous sections and first developed 20 items aligned with the four proposed (**Ardèvol-Abreu** *et al*., 2022) dimensions of MIM stress (five items per dimension). Items included statements such as "When you use MIM, you are forced to interact [through text, voice, etc.] with too many people at the same time" (for MIM *overload*); "You feel that MIM gets in the way of your daily routines" (for MIM *invasion*); "The features of MIM apps force you to reply to messages too quickly (for MIM *urgency*); or "One has to give a lot of thought to the messages one exchanges so as not to misinterpret them" (for MIM *ambiguity*). The syntactic structure of these items imitates that of earlier technostress measurement scales (for example, that of **Tarafdar** *et al*., 2007). This approach helps achieve content validity of the main construct and its component dimensions. Answers were given on a 5-point scale, ranging from 1 = *never* to 5 = *all the time*.

Second, we also created a list of 28 items about different uses of MIM that were adapted from previous studies and opinion polls (**Costa-Sánchez**; **Guerrero-Pico**, 2020; **Gil de Zúñiga**; **Ardèvol-Abreu**; **Casero-Ripollés**, 2021; **Gil de Zúñiga**; **Jung**; **Valenzuela**, 2012; *Pew Research Center*, 2015; **Quan-Haase**; **Young**, 2010). These items were aimed to reflect a variety of uses belonging to categories and subcategories such as *relatedness, intimacy, and social interaction* (e.g., "Generally speaking, how often would you say you use MIM apps to stay in touch with family and friends?"), *study* (e.g., "[…] to ask or answer questions related to your studies?"), or *pastime and entertainment* (e.g., "[…] to entertain yourself?") (see the complete list of categories in **Ardèvol-Abreu** *et al*., 2022). All items were also measured on five-point scales (1 = *never* to 5 = *all the time*).

Finally, the questionnaire incorporated the European Spanish version of the Perceived Stress Scale (**Remor**, 2006), which is a translation of the 14-item Perceived Stress Scale (PSS) of **Cohen**, **Kamarck**, and **Mermelstein** (1983). The PSS is not a measure of technostress, but an instrument that seeks to measure "the degree to which individuals appraise [general] situations in their lives as stressful" (**Cohen**, 1986, p. 716; text within brackets is ours). We use the PSS, which is theoretically related to our main construct of interest, as an external standard to further assess its validity (see **Muñiz**; **Fonseca-Pedrero**, 2019). It contains items such as "How often have you felt that you were effectively coping with important changes that were occurring in your life?" Cronbach's alpha coefficient for the PSS showed satisfactory internal consistency (complete sample; $\alpha = .85$, $M = 25.14$, $SD = 7.45$).

The survey was hosted on the survey site *Qualtrics* and open to responses between July 5 and 8, 2021. We contracted with the international online research company Netquest to recruit a national sample whose demographic composition approximated the Spanish population in terms of age, gender, and education level. For this purpose, *Netquest* distributed the survey links to 3,458 of their Spanish panelists. After giving their informed consent, 1,259 of them provided valid responses. Respondents were uniquely identified by an anonymous ID, but we did not collect any personal identifying information. The questionnaire was written in Spanish, and respondents received economic compensation for their time. Our final sample comprises 52.1% females, reported a mean age of 45.66 years ($SD = 14.99$; 10.9% younger than 25 years, 14.9% between 25 and 34, 22.3% between 35 and 44, 38.3% between 45 and 64, and 13.6% aged 65 or over), and a median education level of high school graduate ($M = 3.79$, $SD = 2.09$; ranging from 1 = *primary education* to 7 = *postgraduate and doctoral studies*; 14.3% had only primary education, while 37.2 had some university education or more).

5. Statistical analyses

> Mobile instant messaging (MIM) apps may be a specific source of technostress

To develop our latent measures of MIM stress and MIM uses, we first employed exploratory factor analysis (EFA) with geomin rotation. This allowed us to "determine the number of continuous latent variables that are needed to explain the correlations among [our] set of observed variables" (**Muthén**; **Muthén**, 2017, p. 43). In each EFA, we defined lower and upper limits on the number of factors to be extracted (see **Muthén**; **Muthén**, 2017, p. 46). Then, we continued with confirmatory factor analysis (CFA) to test the structure identified in the EFA. Since "using the same sample for both EFA and CFA [is] an undesirable practice" (**Lorenzo-Seva**, 2021), we generated two approximately equal subsets of the sample by using the routine 'select random sample of cases' (*SPSS* v. 25): $n_1 = 613$, $n_2 = 646$. We utilized the first subsample to conduct EFAs on the items of MIM stress, on the one hand, and MIM uses, on the other. Then we used the second subset of respondents to separately confirm both measurement models through confirmatory factor analyses (CFAs). Finally, we tested the structural model (SEM) of MIM uses on MIM techno-stressors using the whole sample (N = 1,259). Analyses were conducted with the aid of the statistical package *MPlus 8.0* (**Muthén**; **Muthén**, 2017)

6. Results

To test our hypothesis, we first performed EFA on the 20 stress items. For this analysis, we used maximum likelihood (ML) estimation and extracted factors in a range from 3 to 7. After examining fit indices and factor loading patterns, we decided on a four-factor model. In this solution, however, some items showed large cross-loadings or low factor loadings. After four iterations of the EFA, we removed two items from the *invasion* dimension and two more from *urgency*. The resulting 16-item, four-factor solution showed good fit indices: χ^2/df = 2.78; CFI = .98; TLI = .97; RMSEA

= .05; SRMR = .02; BIC = 21821.27. A simpler three-factor solution, with *invasion* and *urgency* items collapsed into a single factor, showed a worse chi square to df ratio (5.58), a suboptimal TLI (.92), and increased RMSEA (.09) and BIC (21984.15).

> We develop and test a four-dimensional, second-level measure of MIM techno-stress

We then applied the four-factor solution to a second-order CFA of MIM stress using the other half of the sample and ML as estimator. The model showed a good fit on some indices, but the RMSEA value was somewhat high and the TLI suboptimal (χ^2/df = 4.84; CFI = .95; TLI = .94; RMSEA = .08; SRMR = .05; BIC = 22580.74). After considering suggested modification indices, we included two residual covariance paths (see **Monacis** *et al*., 2017) between two items on the *MIM overload* factor and two items on the *ambiguity* factor, respectively (see Fig. 1). The modified model provided a better fit to the data: χ^2/df = 3.94; CFI = .96; TLI = .96; RMSEA = .07; SRMR = .04; BIC = 22495.46. All factor loadings reached statistical significance in a range from .71 to .90. Each specific dimension of stress showed very good levels of internal consistency, with all Cronbach's alphas above .80. Our hypothesis was therefore supported. Sample means and standard deviations for each dimension were as follows: *overload* (averaged five-item measure, *M* = 2.34; *SD* = 0.85), *invasion* (averaged three-item measure, *M* = 2.27; *SD* = 1.00), *urgency* (averaged three-item measure, *M* = 2.34; *SD* = 0.90), and *ambiguity* (averaged five-item measure, *M* = 2.49; *SD* = 0.92). As expected, correlations of MIM stress and its dimensions with the external standard of perceived stress in daily life (PSS) were positive and significant, ranging from .13 to .22: MIM stress and PSS, *r* = .21, *p* < .001; overload and PSS, *r* = .13, *p* < .001; invasion and PSS, *r* = .16, *p* < .001; urgency and PSS, *r* = .19, *p* < .001; ambiguity and PSS, *r* = .22, *p* < .001. The exact wording of the 16 MIM stress items can be found in the Annex.

To explore and confirm the factor structure of the 28 MIM use items, we followed an analogous procedure, but in this case we did not treat the dependent variables as continuous because some MIM uses were rare in our sample and responses gathered in the first category (*never*). This applies especially to the items referring to job search, study-related uses, political participation and, to a lesser degree, sale/purchase transactions. For this reason, we declared MIM use variables as categorical and used weighted least square mean and variance adjusted (WLSMV) estimation. The rotated EFA using the first subsample produced a well-fitting 10-factor solution, but some of the resulting factors had less than three defining items (e.g., two items for job search, two items for advertising and sale/purchase transactions) or collectively assessed very low-frequency behaviors (e.g., four items for political participation with an averaged mean value of 1.67 in a 1 = *never* to 5 = *all the time* scale).

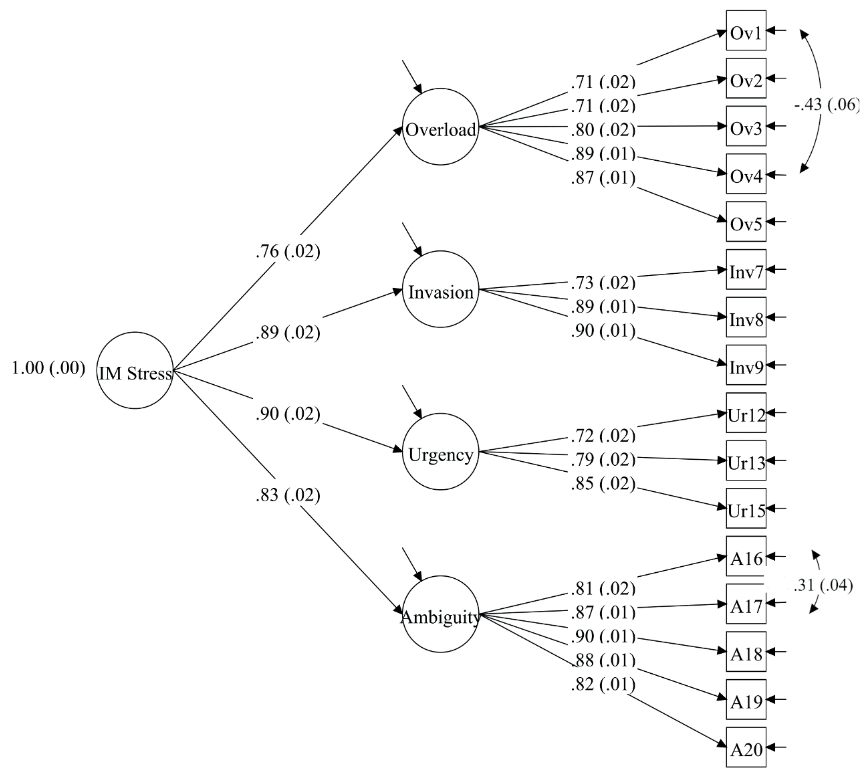

Figure 1. Second-order confirmatory factor analysis of MIM stress.
Note: *n* = 642. Coefficients are STDYX estimates. The model uses ML as estimator. Goodness of fit: χ^2/df = 3.94; CFI = .96; TLI = .96; RMSEA = .07; SRMR = .04; BIC = 22495.46. All factor loadings reached statistical significance. Long straight arrows represent paths from latent variables (BY paths). Curved arrows refer to residual covariances. Short, straight arrows are residual arrows.

To furnish a more parsimonious, truly representative of MIM uses solution, we decided to retain those factors connected with work-related uses, news, social interaction, and pastime. In the subsequent EFA on the remaining 13 items, a four-factor solution showed poor fit (χ^2/df = 17.22; CFI = .98; TLI = .96; RMSEA = .16; SRMR = .03), while a five-factor model provided much better indices (χ^2/df = 1.24; CFI = 1.00; TLI = .99; RMSEA = .02; SRMR = .01). The latter solution disaggregated the items of *relatedness, intimacy, and social interaction* into two factors with two items each: *relatedness and intimacy*, and *coordination of social activity*. Although the rule of thumb is not to retain two-item factors, it can be done "if the items are highly correlated (i.e., r > .70) and relatively uncorrelated with other variables" (**Worthington**; **Whittaker**, 2006, p. 821). Our two pairs of social interaction items correlated .66 and .79, respectively, and their correlations with the rest of variables ranged from .18 to .57. Considering all this, we decided not to collapse the two pairs of items and retain them as separate factors.

We then proceeded to confirm the five-factor structure of MIM uses with the second subsample. A CFA of MIM uses (also with WLSMV estimation) showed a good fit to the data: χ^2/df = 2.64; CFI = .99; TLI = .99; RMSEA = .05; SRMR = .02. Factor loadings for all the items in the five factors were significant and ranged from .83 to .96 (STDYX standardization, see item wording in the Annex). Furthermore, each type of MIM use showed good levels of internal consistency as indicated by their Cronbach's alpha coefficients, with values of at least .80. Sample means and standard deviations for each use were as follows: *work-related uses* (averaged three-item measure, M = 2.55; SD = 1.18), *news* (averaged three-item measure, M = 2.61; SD = 1.02), *relatedness and intimacy* (averaged two-item measure, M = 3.81; SD = 0.92), *coordination of social activity* (averaged two-item measure, M = 3.31; SD = 1.02), and *pastime* (averaged three-item measure, M = 3.13; SD = 1.00). The exact wording of the 16 items can be found in the Annex.

Finally, to address our two research questions, we tested two complementary structural equation models of MIM uses on MIM stress. The first one regresses MIM stress (as a second-level construct that integrates four MIM techno-stressors: *overload*, *invasion*, *urgency*, and *ambiguity*) on the five uses of MIM (first order constructs, with observed indicators declared categorical). The overall WLSMV-based model showed acceptable fit to the data (χ^2/df = 4.02; CFI = .96; TLI = .96; RMSEA = .05; SRMR = .04), and suggests that all MIM uses, except for *relatedness and intimacy*, are associated with MIM stress (RQ1): *work-related uses* (β = .302, p < .001), *news* (β = .156, p < .001), *coordination of social activity* (β = .327, p < .001), and *pastime* (β = .120, p < .001). The sign of the association between *relatedness and intimacy* and *MIM stress* was negative but statistically non-significant (β = -.069, p = .176, *ns*).

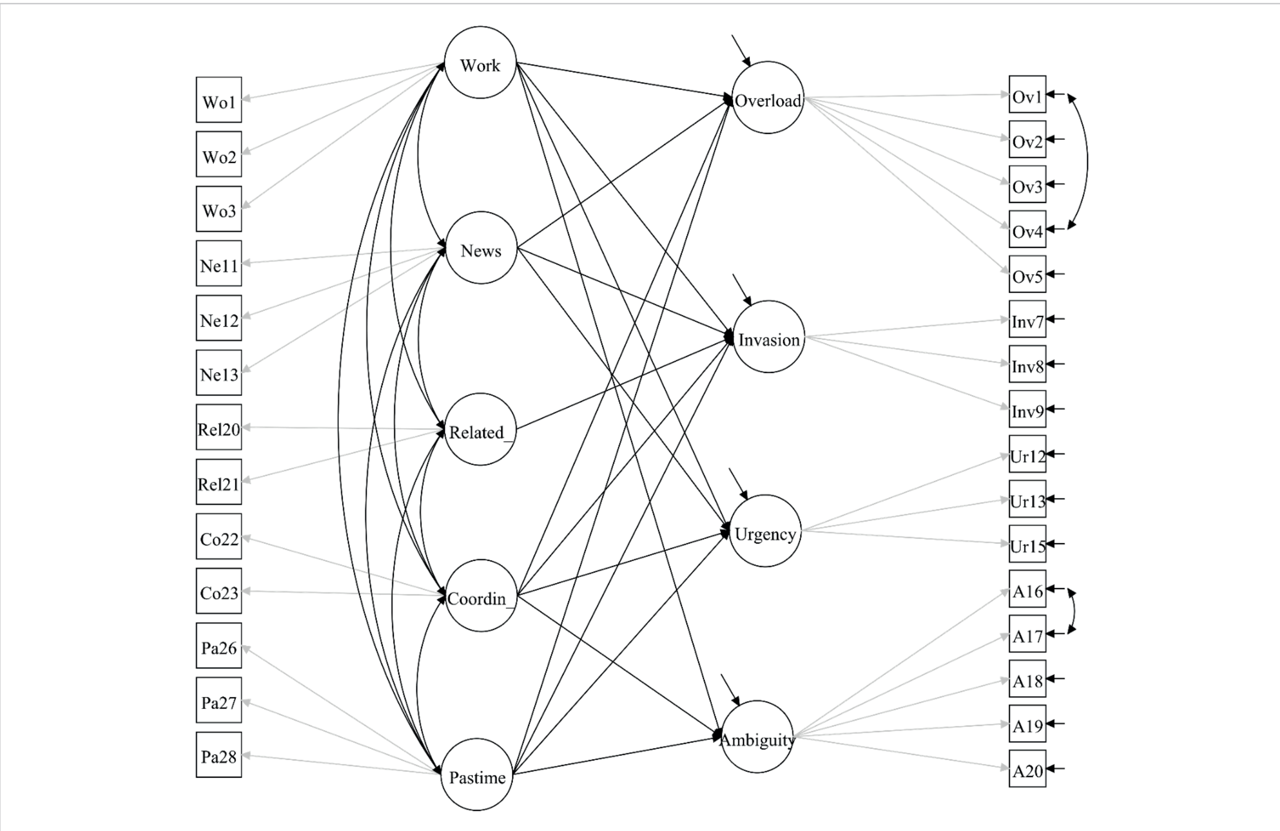

Figure 2. Structural equation model of MIM uses on MIM techno-stressors.
Note: n = 1,257. The model uses WLSMV as estimator, with MIM use variables declared as categorical. Goodness of fit: χ^2/df = 3.58; CFI = .97; TLI = .96; RMSEA = .05; SRMR = .03. Long, straight black arrows represent significant regression paths (ON paths). Non-significant regression paths are not represented. Straight grey arrows represent paths for the latent variables (BY paths). Long curved arrows represent correlations between the latent independent variables, while short curved ones refer to residual covariances. Short, straight arrows are residual arrows. Residual variables and residual covariances of the latent dimensions of MIM stress are not represented for simplicity.

The second overall SEM regresses each dimension of MIM stress on the five uses of MIM (RQ2). The model (Fig. 2) showed good fit indices: χ^2/df = 3.58; CFI = .97; TLI = .96; RMSEA = .05; SRMR = .03. Regression paths indicated that *work uses* of MIM are associated with MIM *overload* (β = .250, *p* < .001), *invasion* (β = .342, *p* < .001), *urgency* (β = .247, *p* < .001), and *ambiguity* (β = .200, *p* < .001). *News uses* are not associated with *ambiguity* (β = .057, *p* = .071, *ns*), but they are with *overload* (β = .233, *p* < .001), *invasion* (β = .080, *p* < .01), and *urgency* (β = .166, *p* < .001). For its part, *relatedness uses* are not associated with *overload* (β = -.067, *p* = .206, *ns*), *urgency* (β = -.025, *p* = .663, *ns*), or *ambiguity* (β = -.031, *p* = .544, *ns*), but they are negatively related to feelings of *invasion* (β = -.119, *p* < .05). *Coordination of social activity* is however related to all dimensions of stress: *overload* (β = .266, *p* < .001), *invasion* (β = .345, *p* < .001), *urgency* (β = .160, *p* < .01), and *ambiguity* (β = .294, *p* < .001). The same applies for *pastime*, that in our sample is also associated with feelings of *overload* (β = .103, *p* < .01), *invasion* (β = .074, *p* < .05), *urgency* (β = .132, *p* < .001), and *ambiguity* (β = .096, *p* < .01).

> We propose four MIM-specific techno-stressors: *overload*, *invasion*, *urgency of response*, and *ambiguity*

7. Discussion and conclusions

Based on earlier qualitative and quantitative research on technostress, this study first developed and evaluated a measure of MIM stress comprised of several techno-stressors. After deciding on a four-factor model and optimizing the scale length using EFA on subsample 1, we assessed its validity and reliability. CFA on subsample 2 confirmed that the data fitted well to the four-factor solution, which is in line with previous qualitative studies (**Ardèvol-Abreu** *et al*., 2022).

Following our theoretical and empirical framework, MIM stress is a higher-order construct that includes four techno-stressors as first-order dimensions: *Overload* refers to situations where MIM users receive too may messages from too many people, which leads them to spend too much time filtering information or dealing with unread messages. *Invasion* is associated with contexts where MIM gets in the way of the users' daily routines or distracts them from other activities. This includes (but is not limited to) work-related issues spilling over into users' personal life. *Urgency* accounts for situations involving social pressures to reply quickly to one's chat partners and expectations for them to do the same. Finally, *ambiguity* defines MIM-based exchanges where users need to make extra efforts to determine the meaning, tone, and intent of messages, which often results in misunderstandings.

The instrument developed in the present study for measuring MIM techno-stressors will be useful for further investigation of the broader MIM stress process. For example, future studies are needed to better understand how, if at all, these MIM techno-stressors set into motion coping responses. These may include affect-related responses (e.g., anger, frustration), MIM use-related responses (e.g., turning on the mobile flight mode at a certain point, leaving or silencing MIM groups, having separate work and personal phones), interpersonal-related (e.g., asking coworkers not to communicate via MIM), etc. (see **Tarafdar**; **Cooper**; **Stich**, 2019). Further research should also explore outcome variables of the MIM stress process and examine immediate (e.g., physiological changes, emotions) and long-term effects (e.g., psychological and somatic well-being, satisfaction with the MIM technology) (see **Lazarus**; **Folkman**, 1987; **Tarafdar**; **Cooper**; **Stich**, 2019).

Second, we followed an equivalent approach to the above to develop a wide-ranging, empirically validated measure of MIM uses. We began exploring the factor structure of a list of items built from earlier work on social media and MIM uses and gratifications (**Ardèvol-Abreu** *et al*., 2022; see also **Costa-Sánchez**; **Guerrero-Pico**, 2020; **Gil de Zúñiga**; **Ardèvol-Abreu**; **Casero-Ripollés**, 2021; **Gil de Zúñiga**; **Jung**; **Valenzuela**, 2012; *Pew Research Center*, 2015; **Quan-Haase**; **Young**, 2010). After finding good support for a five-factor, 13-item solution using subsample 1, we submitted the structure to CFA using subsample 2. Fit indices provided support for a five-factor structure including the following uses of MIM: *work-related* (e.g., performing work-related tasks and staying up to date on work issues), *news* (e.g., stay informed about current events and public affairs), *relatedness and intimacy* (e.g., staying in touch with family, friends, or people one wouldn't meet otherwise), *coordination of social activity* (e.g., coordinating face-to-face meetings with friends and family), and *pastime* (e.g., having fun and entertaining oneself).

Finally, this investigation also showed how various uses of MIM associate differently with MIM stress and its four first-level techno-stressors. Perhaps most relevant for the development of future strategies or guidelines for healthier use of MIM, we found that the only use that is not associated with MIM stress (overall measure) is *relatedness and intimacy.* Quite to the contrary, *relatedness and intimacy uses* are negatively and significantly related to "feelings of invasion." This means that, in our sample, using MIM for relatedness and intimacy purposes may have helped reduce feelings that MIM gets in the way of one's daily routines or distracts one's attention from other activities (*invasion* techno-stressor). We speculate that emotionally close conversations through MIM may cultivate perceptions of social and emotional support, which have been found to provide a buffer against stress and other mental health issues (**Gilmour** *et al*., 2020). This is why warm, close MIM interactions with people we love, even when they are very frequent, do not associate with increased technostress. This reasoning is also in line with previous findings of social media's (e.g., Facebook) potential to increase perceived social and emotional support and, indirectly, minimize perceived stress and even some of its long-term outcomes, such as physical illness (**Nabi**; **Prestin**; **So**, 2013; see also **Wright**'s, 2012, study among college students).

> *Relatedness and intimacy* uses of MIM were not positively related to MIM stress

Using MIM with any other purpose seems more problematic with respect to MIM stress levels—at least when the frequency of usage is high. Thus, *work-related uses*, *coordination of social activity*, *news*, and even *pastime* are positively associated with the overall measure of MIM stress. This means that a higher frequency of usage is related to increased evaluations of MIM as damaging or taxing on one's resources. When we explore the specific techno-stressors behind these associations, we find that *work-related uses*, *coordination of social activity*, and even *pastime* are positively associated with all four MIM techno-stressors. In simpler words, using MIM for any of these purposes is associated with situations where users feel they are overloaded with messages and information; invaded in their personal, face-to-face lives; pressured to reply and anxious to be replied quickly; and confused about the meaning, tone, or intent of the messages. *News uses*, for their part, relate to all MIM techno-stressors except for ambiguity.

> Other uses (e.g., *work*, *coordinating social activity*, and even *pastime*) were related to MIM stress

It is somehow striking that even more recreational uses of MIM (to kill time, have fun, and entertain oneself) associate with higher levels of MIM stress and all its first-level dimensions—at least among our respondents. Although we do not have any empirical basis to provide additional interpretation for this finding, we can offer some conjectures. We know that jokes, memes, and other humorous content are frequently shared through MIM groups, whether they were originally intended for these purposes or not (**Costa-Sánchez**; **Guerrero-Pico**, 2020; **Huang**; **Zhang**, 2019). In this regard, different expectations regarding the purposes or the level of formality of the groups can lead to misunderstandings and ambiguities. As one WeChat user put it in a previous qualitative study (**Huang**; **Zhang**, 2019):

> I found a very funny joke about lawyers and shared it in our law firm's group. Some of my colleagues replied like "haha" or "this is very funny," but our executive asked why it was funny. He didn't get the point. I felt awkward and rarely shared interesting stuff in the group later (p. 1929).

Furthermore, when MIM group chats are large, humorous content can trigger a cascade of comments, emoticons, additional jokes, etc. In these situations, it seems likely that some users may feel that they receive more content that they can read or reply to, that it is difficult to focus on their daily activities, that they should quickly write their feedback in the chat in order not to be excluded from the group, etc. Another possibility is that the entertaining content is pushed to the user at the wrong time–e.g., while they are at work or chatting with someone else in another window. Although they may be eager to interact with the content to have fun, they may also appraise the situation as invasive and overloading.

Although the current study offers important theoretical and empirical contributions to the literature on technostress, it is not without limitations. First, the study design is correlational, and we therefore cannot infer cause and effect relations. This refers to the role of certain uses as actual causes of MIM stress or some of its first-level components. Future designs may find ways to manipulate MIM uses in an experimental setting and also test possible mediating mechanisms linking MIM uses with techno-stressors–for example, through perceived social and emotional support, as suggested above. Second, while our sample is large and demographically diverse, it was drawn from an online panel of respondents and therefore may not be fully representative of the Spanish population. For example, it is likely that our sample under-represents people with low digital competences and internet usage. Finally, our pool of items was produced based on previous qualitative and quantitative work, but we cannot guarantee that it exhaustively covers all possible dimensions of MIM stress and all possible MIM uses.

In spite of these limitations the present study provides important insights into the MIM-specific stress process, its main techno-stressors, and possible usage-related antecedents. From a practical perspective, MIM techno-stressors and their measurement may serve to design tailored recommendations for a healthier use of MIM. It seems important to know what specific demands and MIM techno-stressors are triggering the stress process for a given individual. Also, by knowing how specific uses relate to specific techno-stressors, user may decide to control certain usages (e.g., reduce *MIM use for work*) and take advantage of the beneficial or neutral impact of others (e.g., *relatedness and intimacy*).

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9. Annex. Item wording of the MIM uses and MIM stress constructs

(*The questionnaire was in Spanish and translated for this Annex*).

"The following questions relate to your frequency of use of mobile instant messaging (MIM) apps such as *WhatsApp*, *Telegram*, or *Snapchat*. Generally speaking, how often would you say you use MIM apps to… (1 = *never* to 5 = *all the time*)

Wo1. ask or answer work-related questions?

Wo2. perform work-related tasks?

Wo3. stay up to date on work-related issues?

Ne11. stay informed about current events and public affairs?

Ne12. get additional information about what's going on in your community or residence area?

Ne13. get news about current events and public affairs?

Rel20. stay in touch with family and friends?

Rel21. contact people you wouldn't meet otherwise?

Co22. coordinate social activities (for example, eating out or hanging out with someone)?

Co23. organize face-to-face meetings with friends and family?

Pa26. kill time?

Pa27. have fun?

Pa28. entertain yourself?"

"Below are different statements regarding your use of mobile instant messaging, which will be referred to by its acronym (MIM) for brevity. Indicate how often, in general, you tend to experience the following situations (1 = *never* to 5 = *all the time*). When you use MIM…

Ov1. You are forced to interact (through text, voice, etc.) with too many people at the same time.

Ov2. You receive more messages (text, voice, etc.) than you can read or reply to.

Ov3. You need a long time to filter the information that comes to you.

Ov4. You need to spend a long time dealing with unread messages in the application.

Ov5. You have to deal with too many issues through the application.

Inv7. MIM forces you to stay in touch with your work or studies, even in your free time.

Inv8. You feel that MIM gets in the way of your daily routines.

Inv9. You feel that MIM distracts your attention from other activities.

Ur12. You need your contacts to reply to your messages urgently.

Ur13. When you receive a message, you feel compelled to reply quickly.

Ur15. The features of MIM apps force you to reply to messages too quickly.

A16. You feel there are misunderstandings in your MIM conversations.

A17. MIM creates ambiguities about the meaning of the messages you exchange.

A18. MIM makes it difficult to understand the intent of the messages you exchange.

A19. MIM makes it difficult to interpret the tone of the messages you exchange.

A20. One has to give a lot of thought to the messages one exchanges so as not to misinterpret them."

Effects of narrative-persuasive frames on *Twitter* regarding blood donation: pride versus empathy and people versus numbers

Patricia Durántez-Stolle; Raquel Martínez-Sanz; Isabel Rodríguez-de-Dios

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Abstract

Blood donation in Spain is an altruistic, voluntary and unpaid process. Despite its social and health significance, this process has suffered a standstill in recent years that has been aggravated by the coronavirus pandemic. To promote the generation of new donors, it is necessary to carry out campaigns aimed at younger age groups to improve the information they have and reduce their fears. This research analyses the effectiveness of different frames of a persuasive narrative to increase blood donation. These frames have been constructed from two variables: an emotional appeal (empathy awakened by a recipient protagonist versus the pride experienced by a donor protagonist) and the identification of the beneficiary of the donation (identifiable victim versus generic beneficiary). The manipulated narratives incorporate features of edutainment and are adapted to the tone and language of the target population, young people, in the format of a *Twitter* thread. To test the effectiveness of these narratives, an experimental study was conducted among 600 participants aged 18–30 years. The results show the effectiveness of the emotional appeal, specifically in the threads that are led by a recipient of the blood donation. This appeal induces greater identification among people who perceive themselves as a little or somewhat similar to the protagonist. This outcome in turn positively affects information recall, the intention to share the message and the attitude towards donation, and reduces the perceived risk. All in all, it increases the donation intention. The data confirm a moderated mediation model with identification as a mediator and similarity as a moderator. On the contrary, no statistically significant effects were found regarding the second manipulated variable. No evidence was found that the use of an identifiable beneficiary in the donation appeal obtained better results than the call to donate supported by generic data.

Keywords

Persuasive narratives; Blood donation; Edutainment; Communication campaigns; Health communication; Experimental manipulation; Moderated mediation; Emotive appeal; Message framing; Identifiable Victim Effect; Young population; Social media; *Twitter*.

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1. Introduction

In countries where donating blood is a voluntary, unpaid and anonymous act, communication and awareness campaigns should encourage potential donors to experience a sense of civic duty or social responsibility, bringing the system's needs to the fore and promoting empathy (**Puig-Rovira**; **Graell-Martín**; **Cortel-Mañé**, 2014). However, while altruism is one of the major motivations for blood donation, there are also rewards for donors that need to be valued, such as feeling good about themselves or receiving social approval (**Andreoni**, 1990; **Evans**; **Ferguson**, 2014).

It is increasingly common to use narratives based on edutainment within persuasive communication in the field of health, with a view to encouraging the receiver to identify with the narrative's protagonist. This increases empathy and indirectly affects attitudes (**De-Graaf** *et al.*, 2012; **De-Graaf**; **Sanders**; **Hoeken**, 2016; **Igartua**; **Barrios**, 2012). In addition to the mediation effect of identification in the results, it is necessary to assess the moderation of perceived similarity, produced by the perception of sharing objective and/or subjective traits with the protagonist (**Igartua**; **Fiuza**, 2018).

This research aims to analyse the effects that different persuasive narrative frames in the form of *Twitter* threads with edutainment features have on knowledge and attitudes about blood donation, as well as on the perceived risk of donating, and the intention to donate. It therefore contributes to the advancement of knowledge on how perceived similarity and identification with the protagonist of the story determine the persuasive effect of messages with emotional appeal in the field of health, and to establish the best approaches to the narrative. Two independent variables are used as a starting point, generating four study narratives and groups with a 2 x 2 factorial design. The two variables that form the basis for observing the persuasive results of the narrative message were:

(1) the approach based on emotional appeal (empathic, focused on the recipient's emotions *vs.* pride, focused on the donor's emotions) and

(2) approach based on the donation beneficiary (personalised *vs.* generic or statistical victim).

With the results obtained, blood donation awareness campaigns can be developed to achieve better results in recruiting and retaining young people.

2. From donation needs to awareness campaigns

2.1. Blood donation in Spain

Blood and its derivatives are an essential resource for a country's health systems. They are necessary for surgical interventions, for the treatment of certain diseases such as cancer, and for the production of medicines (*Cruz Roja*, n.d.; *OMS*, 2021). However, as blood is perishable and cannot be artificially produced, availability depends on citizens' donations. In Spain, as in the rest of the European Union, this process is voluntary, anonymous and unpaid, which ensures the quality and safety of the process (**Casado-Neira**, 2003; **Cuadros-Aguilera**, 2017; **Gomes** *et al*., 2019), but at the same time requires social awareness to achieve a stable pool of donors that meets the needs of the health system.

In recent decades, the low birth rate and the ageing of the population have led to a stagnation in the number of blood donations in Spain. It is therefore essential to both build the loyalty of current donors (but above all, to also attract new ones), and to raise awareness of the need for donation to become a habit rather than being a one-off action (**Martín-Santana**; **Beerli-Palacio**, 2008; **Romero-Domínguez**, 2021). The need to adapt to new audi-

> Blood donation in Spain is a voluntary, unpaid and anonymous act in which only 5% of the population that could donate participates

ences to make a generational transition has been apparent for five years (**Ouhbi** *et al.*, 2015) and has been aggravated by the Covid-19 crisis (**Remacha**, 2021). Figure 1 shows the decrease in the number of donations made in Spain in recent years.

According to data from the *Spanish Federation of Blood Donors*, there were around 1,700,000 altruistic blood donations in Spain between 2015 and 2018 (*FedSang*, 2019). Donations were more common in men than in women, and in the 31 to 45 age group. The Spanish *Red Cross* (*Cruz Roja*, n.d.) has noted that, while one in every two people living in Spain will need blood at some point in their lives, only 5% of potential donors come forward to give blood.

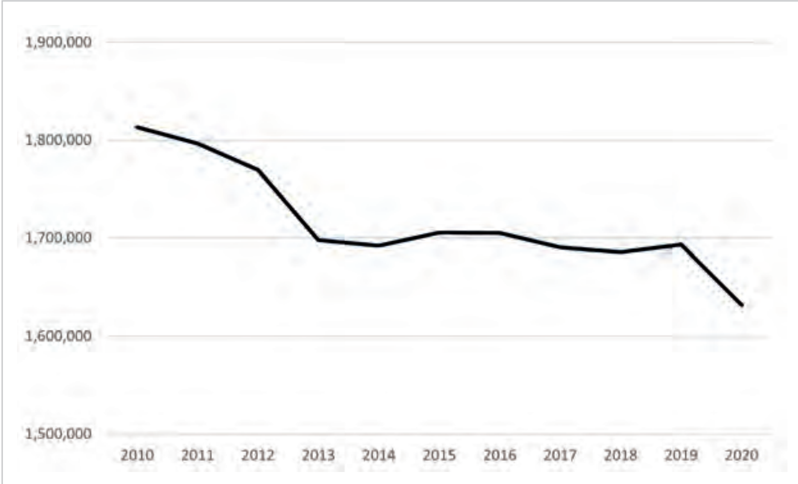

Figure 1. Number of blood donations made in Spain from 2010 to 2020.
Source: Based on data from *FedSang*. Note. The vertical axis has been truncated at 1,500,000 for a better perception of changes over time.

There is a striking contradiction between the general favourable attitude of the population towards blood donation and the recorded donation rates (**Romero-Domínguez**, 2021). According to this author, the main factors that motivate people to give blood include the ease and speed of blood donation; the incentive to save lives; social responsibility; and solidarity. These motivations are shared by donors in countries such as the United States and Canada, as pointed out by **Glynn** *et al*. (2002) or **Smith**; **Matthews**; **Fiddler** (2013). The most frequently reported barriers are the lack of information about the donation process and/or donation sites; lack of motivation; fear of needles or pain; and the possibility of contracting a disease, a myth that still persists (**Martínez-Sanz**, 2021). **Nonis** *et al*. (1996) categorised inhibitors into four dimensions: physical (contagion), psychological (fear), social (moral responsibility) and time (lack of time) risks.

Within this range of constraints, the most influential factor in predisposing people to donate blood is the information that potential donors have about the process involved and the needs and uses of donation. Altruism is an intrinsic motivation, while fear is the factor that leads to the greatest reluctance (**Martín-Santana**; **Beerli-Palacios**, 2008).

Ferguson and **Lawrence** (2016) defined altruism as the desire to maximise the welfare of others at a personal cost, without personal benefit. Whereas the vast majority of research has concluded that altruism is the most decisive motivation for blood donation, it must also be considered that almost no donor presents full, selfless or spontaneous altruism; rather, there are other motivations involved, including the need to feel good about oneself or to receive social approval (**Andreoni**, 1990; **Evans**; **Ferguson**, 2014), which many authors call emotional rewards, impure altruism, or warm-glow. This would explain why donation promotion campaigns that have focused on altruistic and humanitarian messages have not been as successful as expected (**Moussaoui** *et al*., 2016).

In countries where blood donation is voluntary, unpaid and universal, authors such as **Casado-Neira** (2003) consider giving blood as an act that is a gift made to a stranger. Subject to some qualifications, this is framed within gift theory, according to which human beings have a desire to collaborate with their society and implies the hope of some form of reciprocity. For **Cuadros-Aguilera** (2017) and **Gomes** *et al.* (2019), the non-profit principle makes blood donation a civic duty or an act of social responsibility.

> The edutainment-based narrative is an established persuasive mechanism capable of modifying health-related perceptions, beliefs and attitudes

> “Blood donation involves a dynamic act of anonymous empathy: the other is a real but unknown subject’ (**Puig-Rovira**; **Graell-Martín**; **Cortel-Mañé**, 2014, p. 147),

which means that potential donors must imagine the person in need and put themselves in their place in order to generate the intention to help. These authors underlined the importance of showing the act of donating in communication campaigns, as it is not really visible in personal or social relations.

2.2. Communication campaigns to attract donors: different approaches

Research on giving and socially responsible behaviour in general has examined the use of positive approaches (the benefits or lives saved, gain-framed appeal) versus negative approaches (the suffering or lives lost, loss-framed appeal). This is the case of the gain *vs.* loss approach studied by **Cohen** (2010); **Hirai** *et al*. (2020); or **Jiang** and **Dodoo** (2021), among others. According to **Erlandsson**, **Nilsson** and **Västfjäll** (2018), as it is easier to induce negative emotions than positive ones in charity appeals, the negative, loss-based or guilt-based approach is more commonly used.

In this vein, research such as that by **Kong** and **Lee** (2021) on organ donation has noted the difference in placing the emotional appeal to the consequences for the victim (promoting empathy and solidarity) in contrast to the consequences for the donor (pride and satisfaction). This is based on the idea that every altruistic action has a sense of personal benefit, albeit intangible. Their results show that perceived similarity moderates the effects of both emotional appeal frames on behaviour, leading to greater intention to publicise the campaign and intention to become a donor.

A similar strand is found in the appeal to the potential personal benefit of the donation when talking about the future ('it may happen to you') versus helping others, who can be divided into known and unknown people (**Jiang**; **Dodoo**, 2021). While advertising in general tends to focus on the benefits for the target audience, charity appeals tend to focus on the consequences for others and, to a lesser extent, for oneself.

Other approaches used in the construction of social campaigns are temporal framing (current *vs.* future effects) as used by **Choi**, **Park** and **Oh** (2012) and **Kim** (2019); (high *vs.* low) emotional content as noted by **Appel** and **Ritcher** (2010); emotional appeal *vs.* more objective information (**Erlandsson** *et al*., 2016); or beneficiary personalisation *vs.* general statistics (**Erlandsson**; **Björklund**; **Bäckström**, 2015; **Van-Esch**; **Cui**; **Jain**, 2021). Likewise, the effectiveness of different narrative formats has been compared with health issues related to our object of study: testimonies *vs.* dialogues (**Kim**; **Nan**, 2019) and narratives *vs.* information (**Liu**; **Yang**, 2020).

Table 1. List of experimental variables studied in social campaign research

Variables	Studies
Emotional appeal gain *vs.* loss	**Cohen**, 2010; **Erlandsson**, **Nilsson** & **Västfjäll**, 2018; **Hirai** *et al*., 2020
Emotional appeal pride *vs.* empathy	**Kong** & **Lee**, 2021
Emotional appeal self *vs.* others	**Jiang** & **Dodoo**, 2021; **Fisher**, **Vandenbosch** & **Antia**, 2008
Temporal framing (present *vs.* future oriented)	**Choi**, **Park** & **Oh**, 2012; **Kim** & **Nan**, 2019
Emotional content *vs.* information	**Appel** & **Ritcher**, 2010; **Erlandsson** *et al*., 2016
Personalization (identifiable victim) *vs.* statistics	**Erlandsson** *et al*., 2015; **Van-Esch**, **Cui** & **Jain**, 2021
Narrative *vs.* non-narrative	**Liu** & **Yang**, 2020
Testimonials *vs.* dialogues	**Kim** & **Nan**, 2019

In specific campaigns to promote blood donation, it is common for the design of persuasive messages to reinforce the importance of the risk perceived by potential donors, both the risk of the donation itself and the risk of not donating, as well as previous experience (**Mohanty**; **Biswas**; **Mishra**, 2021). Positive messages are more effective when participants rate the risk of donating more highly than the risk of not donating. According to these authors, previous experience does not play a role.

Regarding campaigns specifically targeting young people, **Nonis** *et al.* (1996) investigated whether the target students could be further segmented according to their demographic characteristics, perceived risks, and the influence of non-monetary incentives. While significant differences between donors and non-donors in terms of gender were found, blood type, student classification and influence of incentives, no differences were observed between the four dimensions of perceived risk (physical, psychological, social or temporal). Meanwhile, the study by **Gomes** *et al.* (2019) indicated that 80% of the young people surveyed had never donated blood, but were willing to do so if asked. The most common reasons for not having donated before were that they had never thought about it (25%) and that no one had ever suggested that they should do it (36.7%), data that emphasise the need for awareness campaigns to recruit young people.

According to **Martín-Santana** and **Beerli-Palacios** (2008), awareness campaigns to promote blood donation should focus on information about the need for donation and its impact, as well as removing inhibitors associated with fear and risk. To this end, they proposed that campaigns should focus on more rational messages, avoiding overly emotional ones, and that they should use simple and understandable language based on the testimonial style in the expert version.

2.3. Narrative for persuasive purposes: experimental designs for evaluation

In recent years, the use of narrative for persuasive purposes in the field of health has increasingly resorted to edutainment or educommunication (**Moyer-Gusé**; **Nabi**, 2010; **Shen**; **Sheer**; **Li**, 2015), as opposed to traditional informational-persuasive models. This has sought to bring about changes in people's perceptions, beliefs and behaviours that improve their quality of life and the country's health system (**Igartua**, 2011).

In this type of campaign, messages have a clear narrative structure and emotional components that make them more appealing to audiences. **Green** (2006) established that the narrative focuses on a specific event or occurrence, with a beginning, middle and end; its consumption is motivated by the search for entertainment; and

> Identification with the protagonists is a very important mediating variable: the higher the identification, the greater the emotional impact of the narrative

information is provided by the main characters rather than by external sources.

Educommunication for persuasive health purposes has been widely used in national and international research, especially in the prevention of diseases such as AIDS (**Hether** *et al*., 2008) or cancer (**Green**, 2006; **Igartua**; **Cheng**; **Lopes**, 2003), and the reduction of risk behaviours linked to smoking (**Igartua**, 2021), obesity (**Valente** *et al*., 2007), and unwanted pregnancies (**González-Cabrera**; **Igartua**, 2018).

As noted by **Green**, one of the pioneers of the narrative transportation model, narrative-based health campaigns can change knowledge and beliefs and motivate action or change by creating a sense of immersion in the story that reduces fears of unfamiliar medical processes; provides role models; and generates attitudes based on both knowledge and emotions (**Green**, 2006). Another widely used model is the Extended-Elaboration Likelihood Model (E-ELM) by **Slater** and **Rouner** (2002), which, in addition to the need to achieve impact, appeal to or involve the receiver, considers the degree of identification with the protagonist as a variable for achieving greater immersion in the story.

The primary mediators in the field of narrative persuasion are therefore narrative transportation (immersion) and identification. It has been shown that identification with the protagonists is a major mediating variable on the effects: the higher the identification, the more emotional impact the narrative can have, since it is a cognitive-affective process that increases empathy, and indirectly affects attitudes (**De-Graaf** *et al.*, 2012; **De-Graaf**; **Sanders**; **Hoeken**, 2016; **Igartua**; **Barrios**, 2012). Furthermore, as **Igartua** and **Fiuza** (2018) have shown, a moderating variable is that the greater the perceived similarity to the protagonist, the greater the identification, which derives from the perception of shared objective traits (demographic, gender, nationality...) and subjective traits (personality, beliefs or values). However, the meta-analysis by **Tukachinsky** (2014) argued that the manipulation of objective similarity has generally mild and heterogeneous effects on the transportation into a narrative world, and insignificant or heterogeneous effects on identification.

Another result of edutainment in narrative is that a high degree of similarity increases the likelihood that the audience will better perceive the risk (**González-Cabrera**; **Igartua**, 2018; **Moyer-Gusé**; **Nabi**, 2010) which is made explicit in the message (‘it could happen to me in the future’), causing attitudinal change. Along these lines, some interesting studies have been conducted on the capacity to take edutainment to a more immersive level that favours greater empathy thanks to the gamification of the narrative (**Gómez-García**; **Paz-Rebollo**; **Cabeza-San-Deogracias**, 2021).

This paper continues the line of research on moderated mediation in persuasive narrative on health issues by investigating the effect of different storyline frames in order to improve the effectiveness of blood donation awareness campaigns aimed at young people.

3. Method

3.1. Presentation, objectives and assumptions

This research aims to analyse the effects that different persuasive narrative frames in the form of *Twitter* threads with edutainment features have on knowledge and attitudes about blood donation, and on the perceived risk of donating, and intention to donate. It therefore contributes to the advancement of knowledge on how perceived similarity and identification with the protagonist of the story determine the persuasive effect of messages with emotional appeal in the field of health, and to establish the best approaches to the narrative. Two experimental variables were used to generate the persuasive frames: (1) an approach based on the emotional appeal (to empathy, with a protagonist that receives donations; *vs.* pride, with a protagonist donor, based on **Kong** and **Lee**, 2021) and (2) an approach based on the beneficiary of the donation (personalised *vs.* generic, based on the ‘identifiable victim effect’ used by authors such as **Erlandsson** *et al*., 2015 and **Van-Esch**; **Cui** and **Jain**, 2021).

The experimental research design starting from the premise that edutainment stories achieve better results than informative-persuasive ones. Following the characteristics of this type of appeals (**Igartua**, 2011; **Green**, 2003), a narrative was developed with the following features:

- Narrative structure referring to an event, with introduction (the presentation of the protagonist), a problem (the need for blood components) and a solution (the request for donation).
- High presence of emotions and medium-low level of information about donation. In this case, a framework of positive emotions was chosen, based on the ideas of **Martín-Santana** and **Beerli-Palacios** (2008).
- Attractive for the target population thanks to the language and the channel. The *Twitter* thread was chosen as the narrative support, in which the protagonist’s story is told in the first person, using friendly, accessible language that is suitable for the platform, including hashtags, emoticons, photos and GIFs (**Strauck-Franco**; **Guillén-Arruda**, 2017). The social network itself (**Pietsch**, 2021), based on a study of its data, has recognised the capacity of generation Z to influence the conversations that take place on *Twitter*, driving certain topics and trends through them, as well as showing a greater willingness to participate.

The storyline created for this experiment sought to raise awareness among the younger population of the need to donate blood as a regular process within the health system; and to promote donation by eliminating the most common fears of this target group, as evidenced in a previous study (**Martínez-Sanz**, 2021).

Figure 2. The beginning of two of the *Twitter* threads that manipulated the empathic appeal based on the character of their protagonist: blood recipient or blood donor.

Translation:
Hey people!
Today I want to tell you how much I owe to #blooddonation.
For those who don't know me, I'm Juan, a normal 21-year-old guy, a sports fan and a Business Administration student in Valladolid.

There goes my pose photo of the day.
Yesterday, for the 1st time, I went to #donate with mine.
For those who don't know me, I'm Juan, a normal 21-year-old guy, a sports fan and a Business Administration student in Valladolid.

The extended-Elaboration Likelihood Model (E-ELM) devised by **Slater** and **Rouner** (2002), in addition to providing an impactful and direct beginning for the story that would involve the receiver, was used to promote identification with the protagonist. To achieve greater immersion, socio-demographic and behavioural traits were employed that were similar to those of the target audience, in addition to using a channel, format and language that was accessible to them.

The choice of the first person (as opposed to third-person narratives) relies on the fact that first-person narratives

> "are perceived as more personal, are easier to understand, increase perspective-taking and identification with the protagonist, and are more effective in inducing risk perception" (**Igartua** *et al*., 2021, p. 248).

Consequently, the starting point was what **Igartua** *et al.* (2021) called the 'optimal reception condition' (narrative that emerges from the testimony of a protagonist that is similar to the audience). However, when considering the perspective of the donation (recipient *vs.* donor) as one of the two main variables of the study, it was estimated that in the stories featuring the recipient, the identification with the protagonist would decrease compared with the donor's testimonies, since the latter's story presents a young person who donates for the first time and faces certain fears and doubts about the donating process (see Appendix). In addition, previous research (**Ooms**; **Hoeks**; **Jansen**, 2019) has suggested that this identification will be moderated by perceived similarity to the protagonist of the story.

Based on the above, some hypotheses are proposed that refer to the independent variable that manipulates the emotional appeal of the approach (empathic *vs.* pride):

H1: The type of emotional appeal will influence the level of identification with the author of the thread and this relationship will be determined by the level of perceived similarity with the author.

H1a: Emotional appeal based on pride in the donor will generate greater identification than appeal based on empathy with the recipient.

H1b: The influence of emotional appeal on identification with the author of the thread will be moderated by perceived similarity to the author.

H2: The type of emotional appeal will influence the level of identification with the protagonist, which in turn will be associated with greater effectiveness of the message:

H2a: in recall of the information,

H2b: in the intention to share the message,

H2c: in the attitude towards donating blood, and

H2d: in the perceived risk of the process.

The second experimental variable was the personalisation of the need for blood in a patient who benefits from donations ('Your donation can save people like Pablo'); as opposed to a general call to donate for the benefit of society, providing generic or statistical data ('With your donation you can save up to three lives'). In this case, it is expected that the most effective narratives will be those that personalise and bring the need closer to home, as research on similar topics has concluded (**Erlandsson** *et al*., 2015; **Van-Esch**; **Cui**; **Jain**, 2021). It is therefore hypothesised that:

H3: The type of beneficiary approach will influence the effectiveness of the message. The approach with a beneficiary personalised as an identifiable victim versus a non-personalised or general benefit will lead to:

H3a: stronger intention to share the message

H3b: A better attitude towards blood donation

H3c: Lower perceived risk of the process.

In relation to this hypothesis, and due to the lack of previous research, the following research question regarding the interaction effect between the two independent variables was posed:

P1. What is the best combination of emotional appeal and beneficiary approach to achieve greater message effectiveness?

Finally, based on studies of the Theory of Planned Behaviour applied to blood donation by authors such as **France**, **France** and **Himawan** (2007) and **Giles** (2014), the effects of attitude towards donation and perceived risk on the intention to give blood (the ultimate purpose of the story) will be analysed in relation to the frames used. Based on previous research indicating that a better attitude towards donation and lower perceived risk led to stronger intention to donate blood (**Mohanty**; **Biswass**; **Mishra**, 2021), it is hypothesised that there will be an indirect effect on the intention to donate that will be explained by these two variables:

H4: The effect of emotional appeal (H4a) and the beneficiary approach (H4b) on intention to donate blood will be mediated by the attitude towards giving blood.

H5: The effect of emotional appeal (H5a) and the beneficiary approach (H5b) on the intention to donate blood will be mediated by the perceived risk.

The hypothesised model is summarised in Figure 3.

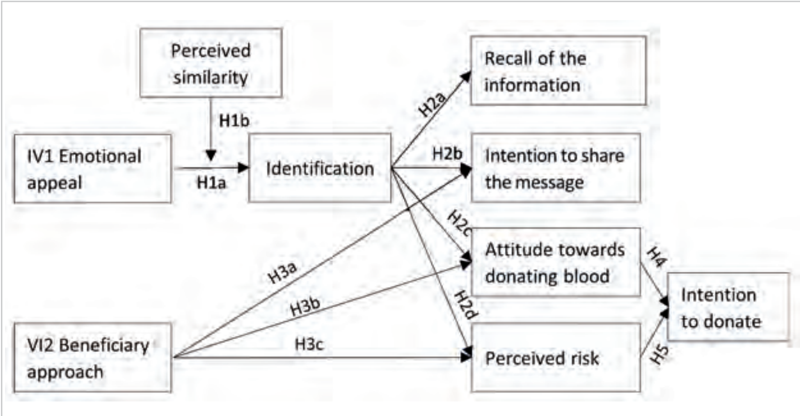

Figure 3. Hypothesised model

Finally, we will also test whether this model works equally well among people who have donated blood before and people who have never donated blood before. That is, whether being a prior donor plays a moderating role in the effect of emotional appeal and the beneficiary approach on message effectiveness will be analysed in order to answer the following research question:

P2. Is the effect of emotional appeal and the beneficiary approach on message effectiveness moderated by the donor status of the participant?

3.2. Design and procedure

To test these hypotheses, an online experiment was conducted between 26 October and 17 November 2021 on a non-probabilistic convenience sample of 600 young people aged between 18 and 30. All participants consumed a narrative message in the form of a *Twitter* thread.

For the experiment, a 2 x 2 factorial design was employed that used independent measures, with four groups and a single post-test measure. As previously indicated, the two independent variables subject to manipulation were: (1) the approach based on the emotional appeal (empathic, focused on the recipient's emotions *vs.* pride, focused on the donor's emotions) and (2) the approach based on the recipient of the donation (personalised *vs.* generic or statistical). Four narratives were generated based on these two variables that were as similar as possible to each other, except for the issues dependent on the variables under study. These stories were then uploaded to *Twitter* and adapted to the format of a message thread with the use of the most common elements in their formulation, such as images, GIFs, hashtags and emoticons. Participants were contacted through a combination of convenience and snowball sampling. They were randomly assigned to one of the four experimental conditions. After giving informed consent, they read the thread to which they had been directed and then completed an online questionnaire.

> In order to achieve greater immersion, the aim was to promote identification with the protagonist by using socio-demographic and behavioural traits similar to those of the target audience, as well as using a channel, format and language that felt close to them

Prior to data processing, a two-step quality filter was performed. Firstly, cases were traced where survey responses were inconsistent with each other, showing little interest in participation. Secondly, the combination of the two questions on the effectiveness of the experimental manipulation was used as a control mechanism to observe cases where both questions were answered incorrectly, again indicating poor participant attention. After taking these steps, the total number of responses was 600.

3.3. Narrative and experimental manipulation

A narrative starring a 21-year-old sports enthusiast and university student was constructed in order to encourage the identification of the campaign's target audience and research subjects. The first person was used to explain the needs of blood donation and the characteristics of the process and to address the most frequent fears. This information was common to all four stories (see Annex).

In the experimental manipulation, the following independent variables were used as a starting point:

1. Emotional appeal: empathy (focused on the consequences for the recipient in need of donation) *vs.* pride (focused on the emotional consequences for the donor), based on the studies by **Kong** and **Lee** (2021). This meant that the protagonist was either a recipient or a donor in the narratives and in the feelings that they experienced because of their status.

2. Beneficiaries of the donation: on behalf of whom the request for a donation is made. Following studies on identifiable victims versus statistics (**Erlandsson**, *et al.*, 2015; **Van-Esch**; **Cui**; **Jain**, 2021), the story ultimately appeals for a donation to be made for a personalised victim, of whom an image is shown ('With your donation you can help Pablo'), as opposed to a message that appeals to the generic benefit of all those in need ('You can save up to 3 lives by donating blood').

3.4. Variables structuring the survey

Each participant in the experiment was randomly referred to one of the four versions of the narrative, each associated with an online questionnaire with a common structure and questions adapted to the differences in the four versions. Before starting to read the story, the user was asked about their donor status and reasons for not donating, based on similar studies such as those by **Gomes** (2019) and **Vásquez**, **Ibarra** and **Maldonado** (2007).

After exposure to the *Twitter* thread, participants answered two questions in order to check the experimental manipulation: (1) 'Do you remember who wrote the *Twitter* thread you have just read?', and (2) 'Who is the focus of the donation request message at the end of the thread?'. In addition to socio-demographic data (age and gender), the questionnaire then included questions on the following variables:

- Information recall. To measure this variable, four true/false statements were included that asked about information that had been provided in the thread (e.g. 'It is advisable to donate blood on an empty stomach'). A recall index was created by adding up the correct answers (M = 3.69, DT = 0.54).
- Perceived risk. This variable was measured using the **Chen** (2017) scale, consisting of two items (e.g. 'Donating blood is safe and there is no risk of getting an infection') measured on a 7-point scale (from 1 = strongly disagree to 7 = strongly agree). A perceived risk index was created from the average of the two items (r = 0.20, p < 0.001; M = 5.74, DT = 0.98). A high value for this variable indicates lower perceived risk.
- Attitude towards blood donation. A three-item scale was devised based on **Guglielmetti-Mugion** *et al.* (2021) (e.g. 'I think donating blood is useful'), measured on a 7-point scale (from 1 = strongly disagree to 7 = strongly agree). An index of attitude towards blood donation was generated with the average of the items (α = .55; M = 6.45, DT = 0.65).
- Intention to donate blood. The measurement of this variable used the scale developed by **France**, **France** and **Himawan** (2007) consisting of three items (e.g. 'In the next three months... I intend to donate blood') on a 7-point scale (from 1 = unlikely to 7 = likely). Based on the average of the three items, an index of intention to donate blood was established (α = .95; M = 4.31, DT = 1.99).
- Identification with the protagonist. An adapted version of the scale by **Igartua** and **Barrios** (2012) was used to measure this variable, as was done in the study by **Rodríguez-de-Dios**, **Igartua** and **D'Haenens** (2021). Six items were included (e.g. 'I have imagined how I would act if I were in Juan's place') on a 5-point scale (from 1 = strongly disagree to 5 = strongly agree). Based on these items, an index of identification with the protagonist was constructed (α = .81; M = 3.54, DT = 0.75).
- Perceived similarity to the author of the thread. This variable was measured using the research by **Igartua** *et al*. (2018) as a reference. Two items were used (e.g. 'How similar do you think you are to Juan?') on a 5-point scale (from 1 = nothing to 5 = a great deal). A perceived risk index was created from the average of the two items (r = 0.74, p < 0.001; M = 2.95, DT = 0.80).
- Intention to share the message. The scale developed by **Barbour**, **Doshi** and **Hernández** (2016) was adapted following the study by **Guerrero-Martín** and **Igartua** (2021). Five items were included (e.g. 'I would "like" this *Twitter* thread') measured on a 7-point Likert scale (from 1 = strongly disagree to 7 = strongly agree). An index of intention to share the message was created by averaging the five items.

3.5. Participants

After the quality filter described above, the final study sample consisted of 600 young people (142 in thread 1, 156 in thread 2, 147 in thread 3, and 155 in thread 4), within the 18- to 30-year-old age range. From the total of participants, 61.7% were female, 36.3% were male, 1% identified themselves as non-binary gender and 1% preferred not to say. Furthermore, 74.8% of the sample had not donated blood before, whereas 25.2% had done so, similarly to those identified in the study **Martínez-Sanz** and **Durántez-Stolle** (2021) in Spain, and somewhat higher than those found by **Gomes** *et al.* 2019 among Portuguese young people.

The random assignment of participants to the different experimental conditions was successful. No statistically significant differences were found between the four experimental groups in terms of gender (χ^2 (3, N = 600) = 7.488, p = 0.586), age (F (3, 596) = 1.63, p = 0.181), or previous blood donor status (χ^2 (3, N = 600) = 0.031, p = 0.999).

4. Results of the study

4.1. Preliminary analysis

An analysis of the results showed that the experimental manipulation of the two independent variables was effective. Firstly, participants recognised the emotional appeal of the narrative by correctly identifying the role of its author (χ^2 (1, N = 600) = 504.199, p < 0.001). After reading the thread with the empathetic approach, 95.3% of participants indicated that the author was 'Juan, a blood recipient, a person who has needed transfusions' while 96.4% indicated that the author was 'Juan, a blood donor, a person who has donated blood' when they came into contact with a thread that appealed to donor pride. In addition, participants correctly identified the person on whom the request for a donation was focused (χ^2 (1, N = 600) = 253.923, p < 0.001). Of the participants who accessed a story with a personalised approach, 73.4% indicated that the donation was requested 'for a specific person'. Similarly, 91.0% of respondents indicated that 'help was not personalised. Donations were requested for all the people in need' after reading a thread with a generic approach.

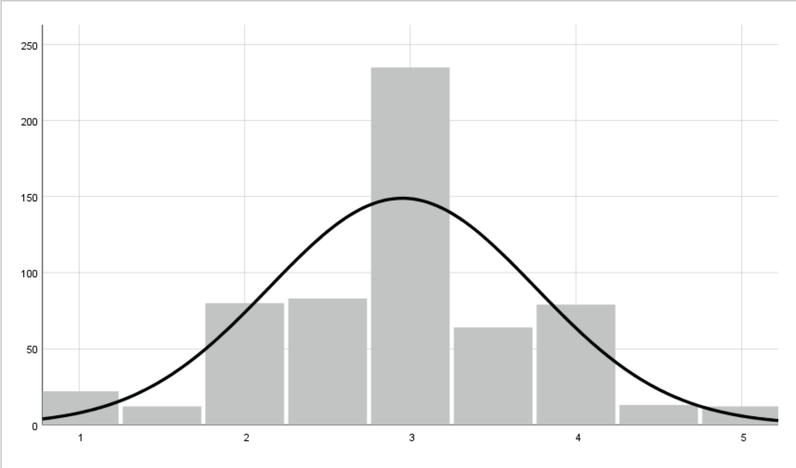

Figure 4. Histogram of perceived similarity to thread author and normal distribution curve

Regarding the study's moderator variable (the perceived similarity with the author of the thread), Figure 4 shows the distribution of this variable among the participants. It was also checked whether there was any relationship between this variable and the socio-demographic variables. A correlation between age and the level of perceived similarity was found, r (598) = .09, p = 0.025. Older participants were therefore perceived to be more similar. In contrast, there was no difference in the level of perceived similarity based on either gender, F (3, 596) = 1.222, p = 0.301 or previous donor status, t (586) = 1.81, p = 0.071.

Finally, the correlations between the mediating variable (identification with the protagonist of the thread) and the dependent variables were analysed in order to test whether the mediating processes showed convergent correlations with the proposed hypotheses. The results presented in Table 2 justify the mediation model formulated.

Table 2. Correlations between mediating and dependent variables

	1	2	3	4	5	6
1. Identification	-					
2. Recall of information	.134***	-				
3. Intention to share the message	.447***	.048	-			
4. Attitude towards donation	.309***	.112**	.386***	-		
5. Intention to donate	.238***	.091*	.253***	.279***	-	
6. Perceived risk	.092*	.154***	.080*	.251***	.304***	-

Note. * p < .05, ** p < .01, *** p < .001 - The data in red was not significant (p = .237).

4.2. Effect of emotional appeal on identification with the protagonist (H1)

The first hypothesis posited that emotional appeal based on the donor's pride would generate greater identification (H1a) and that this effect would be moderated by perceived similarity to the thread author (H1b).

Model 1 of the *Process* macro for *SPSS* (**Hayes**, 2018) was used based on 10,000 samples of bootstrapping and a confidence level of 95% to test this hypothesis. The results show that there was a direct effect of emotional appeal on identification, B = -0.95, p < 0.001. However, contrary to what was hypothesised, it was the message with the empathic emotional appeal (recipient of the donation) that generated stronger identification with the author of the thread. Participants who read the thread written by the recipient identified more strongly with the author (M = 3.60; DT = 0.71) than those who read the thread written by the blood donor (M = 3.49; DT = 0.79).

The moderation effect was also significant, although in the opposite direction to what was hypothesised, B = -.26, p < 0.001. The level of perceived similarity with the author of the thread determined the effect of the emotional appeal on identification with the protagonist. However, the empathy-based emotional appeal generated stronger identification among those who perceived themselves as not being very similar to the protagonist (B = -0.44, SE = 0.08, p < 0.001), or somewhat similar (B = -0.18, SE = 0.05, p < 0.001), as opposed to those who perceived themselves as being quite similar (B = 0.07, SE = 0.08, p = 0.363).

4.3. Analysis of the conditional process of indirect effects with identification as a mediator (H2)

The second hypothesis of the study was that the type of emotional appeal would have an indirect effect on information recall (H2a), intention to share the message (H2b), attitude towards blood donation (H2c), and perceived risk (H2d). This indirect effect would be mediated by identification with the protagonist and moderated by the level of perceived similarity. Model 7 of the *Process* macro for *SPSS* was used to test these hypotheses.

There was a statistically significant conditional indirect effect between those participants who perceive themselves as being slightly or somewhat similar in all the analyses (see Table 3).

Table 3. Indirect effects of emotional appeal on dependent variables

Dependent variable	Perceived similarity	*B*	*SE*	95% *IC*	Moderated mediation index
Recall of information	Slightly	-0.04	0.02	-0.08, -0.01	0.02, *SE* = 0.01, 95% *IC* [0.007, 0.047]
	Somewhat	-0.02	0.01	-0.03, -0.05	
Intention to share the message	Slightly	-0.37	0.08	-0.53, -0.22	0.21, *SE* = 0.06, 95% *IC* [0.10, 0.33]
	Somewhat	-0.15	0.04	-0.24, -0.07	
Attitude towards donation	Slightly	-0.12	0.03	-0.17, -0.07	0.07, *SE* = 0.02, 95% *IC* [0.03, 0.11]
	Somewhat	-0.05	0.01	-0.08, -0.02	
Perceived risk	Slightly	-0.05	0.03	-0.10, -0.02	0.03, *SE* = 0.02, 95% *IC* [0.01, 0.06]
	Somewhat	-0.02	0.01	-0.04, -0.01	

As the analyses of the previous hypothesis indicated, emotional appeal based on empathy towards the blood recipient led to greater identification between people who perceived themselves as being slightly or somewhat similar. This second analysis also showed that identification with the author of the thread explained the indirect effect of this empathic appeal on information recall, intention to share the message, a better attitude towards blood donation and a lower perceived risk. Therefore, the thread with the recipient of the donation (emotional appeal to empathy) resulted in a stronger identification, and this in turn had a positive effect on all dependent variables.

4.4. Effect of beneficiary approach (H3)

The third hypothesis of the study was that the type of approach based on the beneficiary (beneficiary personalised as an identifiable victim *vs.* general victim or statistics) would influence intention to share the message (H3a), attitude towards blood donation (H3b), and perceived risk (H3c). To test this hypothesis, a Student's t-test for independent samples was performed. The results showed that the type of beneficiary approach had no effect on the intention to share the message, t (598) = -0.14, p = 0.887, attitude towards blood donation, t (598) = 1.00, p = 0.318, or perceived risk, t (598) = 1.32, p = 0.187.

Therefore, regardless of whether the beneficiary's approach was personalised and focused on one victim, or not personalised and talked about victims in general, the effectiveness of the message did not change. In other words, the type of beneficiary approach had no effect.

A question was posed in connection with this hypothesis to assess whether there was any interaction effect between emotional appeal and beneficiary-based approach (P1). To answer this question, a two-factor Anova test was used which showed that there was no interaction in any of the variables considered.[1] This indicates that the type of beneficiary approach had no direct individual or interaction effect on the dependent variables in this study. Therefore, using one benefit-based approach or another did not affect the effectiveness of the message. Only the type of emotional appeal influenced its effectiveness.

4.5. Analysis of the conditional process of indirect effects on attitudes towards donation as a mediator (H4)

The fourth hypothesis of the study posited an indirect effect of emotional appeal (H4a) and benefit-based approach (H4b) on the intention to donate blood that would be mediated by attitude towards donation. In the case of emotional appeal, this effect would, moreover, be pre-mediated by identification with the protagonist and moderated by the level of perceived similarity.

Model 83 of the *Process* macro for *SPSS* was used to test hypothesis 4a. The results showed a statistically significant conditional indirect effect between participants who perceived themselves as being slightly, *B* = -0.08, *SE* = 0.02, 95% *IC* [-0.13, -0.04] or somewhat similar, *B* = -0.03, *SE* = 0.12, 95% *IC* [-0.06, -0.01]; moderated mediation index, *B* = -0.03, *SE* = 0.12, 95% *IC* [-0.06, -0.01]. In other words, as in the previous hypotheses, the emotional appeal of empathy (blood recipient) generated stronger identification with the author of the thread, which in turn led to a better attitude towards blood donation and, ultimately, a greater intention to donate blood. Therefore, attitude towards donation would explain the effect of empathic emotional appeal on the intention to donate blood.

> The emotional appeal to empathy with the recipient was found to be more effective than the appeal to pride in the donor, regardless of the reader's previous experience. The results of this pilot study will allow the development of better campaigns to promote blood donation among young people

Model 4 of the *Process* macro for *SPSS* was used to test hypothesis 4b. There was neither a direct effect, *B* = 0.13, *SE* = 0.15, *p* = 0.394, nor a statistically significant indirect effect, *B* = -0.04, *SE* = 0.04, 95% *IC* [-0.13, 0.04], of the benefit-based approach on the intention to donate blood. Consequently, as in the previous hypotheses, the type of beneficiary-based approach had neither a direct nor an indirect effect on the variables considered.

4.6. Conditional process analysis of indirect effects with perceived risk as a mediator (H5)

The fifth hypothesis of the study posited an indirect effect of emotional appeal (H5a) and benefit-based approach (H5b) on the intention to donate blood that would be mediated by perceived risk. That is, the effect of the emotional appeal and beneficiary-based approach on the intention to donate blood would be explained by the perceived level of risk. In the case of the emotional appeal, this effect would, moreover, be pre-mediated by identification with the protagonist and moderated by the level of perceived similarity.

Model 83 of the *Process* macro for *SPSS* was used to test hypothesis 5a. The results showed a statistically significant conditional indirect effect between participants who perceived themselves as slightly, *B* = -0.03, *SE* = 0.02, 95% *IC* [-0.06, -0.01], or somewhat similar, *B* = -0.01, *SE* = 0.01, 95% *IC* [-0.03, -0.01]; moderated mediation index, = 0.02, *SE* = 0.01, 95% *IC* [0.01, 0.04]. In this case, participants who read the thread written by the blood recipient (emotional appeal of empathy) identified more with the blood recipient, and this reduced their perception of the risk associated with donation. This reduction in perceived risk in turn led to a greater intention to donate blood.

Model 4 of the *Process* macro for *SPSS* was used to test hypothesis 5b. Again, there was neither a direct effect, *B* = 0.15, *SE* = 0.15, *p* = 0.323, nor a statistically significant indirect effect, *B* = -0.06, *SE* = 0.05, 95% *IC* [-0.17, 0.03] of the manipulation of the beneficiary-based variable on the intention to donate blood. Therefore, as in the previous hypotheses, the type of beneficiary-based approach had neither a direct nor an indirect effect on the variables considered.

The final research question of the study was whether prior donor status would play a moderating role on the effect of the two independent variables considered in the study: emotional appeal and beneficiary-based approach. In order to test whether donor status affected the influence of the emotional appeal and beneficiary-based approach on the dependent variables, a moderation analysis was conducted through Anova testing. However, none of the analyses performed were significant. Consequently, for both prior donors and non-donors, the emotional appeal to empathy in the thread written by the blood recipient was the most effective message.

5. Discussion and conclusions

There is a need to raise social awareness of blood donations, as blood and its derivatives have a limited shelf life, cannot be manufactured, and are widely used in the health system. However, Spanish organisations such as the *Red Cross* have shown that only 5% of the population who could donate do so. This situation reinforces the importance of investing in awareness-raising campaigns to support the behaviour of those who have already donated and to attract new donors, especially young people, to enable a successful generational transition.

The experimental research design used here (2 x 2 factorial design) analysed the effects that different persuasive frameworks had on knowledge and attitudes about blood donation, as well as on perceived risk and intention to donate. An edutainment-based story was used, with a protagonist narrator that had similar traits to the target group (young people) and a channel and language adapted to it (a *Twitter* thread with GIFs, hashtags, emoticons and photos). With the manipulation of the first variable, the effects of the emotional appeal to empathy with the recipient of the donation versus the appeal to the donor's pride were assessed, while also studying how perceived similarity (moderator) and identification with the protagonist of the story (mediator) affected the persuasive effect. With the manipulation of the second variable, the effects of using an identifiable victim in the story, as opposed to

> The narrative written by the blood recipient (the emotional appeal to empathy) promoted greater identification, which improved the attitude towards donation and reduced the perception of the associated risk, increasing the intention to donate

using general data on the beneficiaries of the donation, were observed on the different dependent variables that assessed the effectiveness of the message.

> Donor status (previous experience) did not affect the results of the manipulated variables: for both donors and non-donors the most effective approach was the thread written by the recipient

The experimental study conducted here shows that perceived similarity moderated the persuasive effects of emotional appeal in the two manipulated strands (recipient-empathy and donor-pride) on the thread reader's behaviour and intention to donate, in agreement with the results obtained by **Kong** and **Lee** (2021). However, the prediction that the story appealing to pride, starred a young donor who overcame their fears and donated for the first time (the one closest to the target audience, who had a higher perceived similarity and identification) did not hold true. This may have been due to the fact that participants see donation as a personal and intimate gesture, and not as an act of public display. What might explain the affinity with the protagonist who received the donation, a sick young man, would be the identification with the reaction to a similar situation: uncertainty about the future and the desire to live, as can be inferred from the narrative.

Consequently, the persuasive effectiveness of the appeal to empathy on the intention to donate was confirmed, in line with what was stated by **Puig-Rovira**, **Graell-Martín** and **Cortel-Mañé** (2014), for whom representing the needs of the other, the recipient of blood, encourages the potential donor to put themselves in their place and promote the help sought.

In either case, identification with the protagonist, moderated by perceived similarity, was shown to mediate the indirect effect of the emotional appeal story on information recall, intention to share the message, attitude and perceived risk in accordance with the Extended-Elaboration Likelihood Model (E-ELM) by **Slater** and **Rouner** (2002).

It was also corroborated that the emotional appeal in persuasive narratives that seek to promote altruistic blood donation is affected not only by identification but also by the attitude towards donation and the perceived risk. The empathic approach obtained the best results compared to the pride frame, which means that putting oneself in the place of the other person (the sick person who needs our help) minimises the perception of the main risks attributed to blood donation by young people: the transmission of diseases and the physical pain that blood collection may cause.

In this regard, it is striking that previous experience, that is, having donated before, does not interfere with the effects of the two independent variables considered in the study, emotional appeal and beneficiary-based approach, reinforcing the results of the work by **Mohanty**, **Biswas** and **Mishra** (2021) on perceived risk by donors and non-donors.

Based on the results obtained from this first experimental manipulation, a moderated mediation model is established that shows the statistically significant relationships produced by the emotional appeal on the different dependent variables of the persuasive process for blood donation (Figure 5).

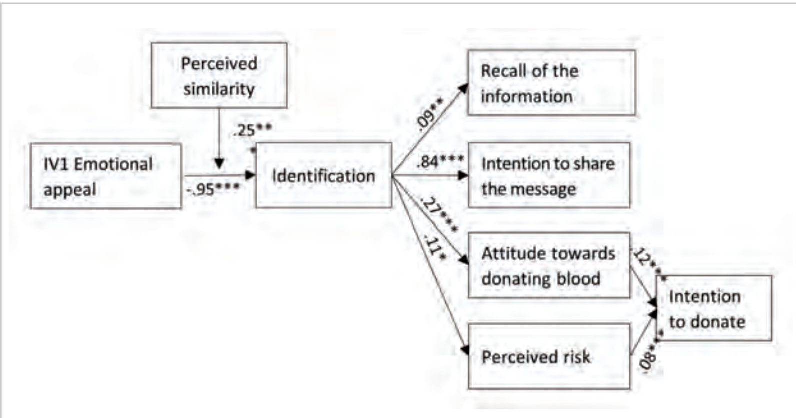

Figure 5. Moderated mediation model.
Note. Non-standardized regression coefficients are shown (*B*)
* $p < .05$, ** $p < .01$, *** $p < .001$.

The study's second independent variable, aimed at manipulating the beneficiary-based approach, did not work as expected in either of the two frames (identifiable victim *vs.* general or statistical victim), as it had neither direct nor indirect effects on the reader's knowledge (assessed in 'information recall') and attitudes about donation or intention to donate. This lack of results was in line with the thesis proposed by **Moussaoui** *et al*. (2016), who found no significant reaction to donor retention messages that relied on the argument of saving lives.

The lack of results in the manipulation of this variable calls for reflection on the reasons why the personalised framework ('your donation can help Pablo'), widely used in solidarity campaigns (**Erlandsson** *et al.*, 2015; **Van-Esch**; **Cui**; **Jain**, 2021), did not have the expected effect when applied to donating blood. Firstly, the difficulty of making the recipient of the message feel that the donation is intended for a specific person must be considered, since most respondents are aware that blood donation is an anonymous process in Spain, which may have led to a lower percentage of correct answers to the control question on the variable 'personalised beneficiary'. Secondly, the part that appealed to donation was at the end of the story, when the reader may have less interest in, paying less attention to, reading, although in the control question on the variable 'generic beneficiary' there was a higher number of hits (91% *vs.* 73.4%). In any case, both issues should be considered to be limitations of the study and be taken into account in future research.

In light of these results, and in order to continue the study of persuasive narrative to promote blood donation in young people, future research could further analyse the appeal from the perspective of the protagonist (donor *vs.* recipient) by combining this variable with the positive or negative emotional appeal, emphasising the frame of lives lost versus lives saved.

With respect to previous research, this experimental analysis advances the existing understanding of moderated mediation models applied to narrative persuasion in health. Specifically, greater effectiveness was found in the emotional appeal to empathy, with a story featuring the recipient of blood donations, as opposed to the appeal to the sense of pride experienced by a donor, effects that occurred regardless of the previous donor status of the reader of the story. These results could have practical application in developing awareness campaigns to improve the recruitment and retention of young blood donors.

6. Note

1. Since all analyses were non-significant, statistical data have not been reported in order to make the text more concise.

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8. Annex

Table 4. Summary of the content of the stories based on the manipulated variables

	Narrative 1	Narrative 2	Narrative 3	Narrative 4
ELEMENTS COMMON TO ALL FOUR STORIES				
Socio-demographic characteristics of the protagonist	- Age (21) -Hobby (sport) - Education Business Management and Administration	Same as Narrative 1	Same as Narrative 1	Same as Narrative 1
Information on blood donation	- Not doing without eating - Duration - Typical uses - Expiry date - Painless process	Same as Narrative 1	Same as Narrative 1	Same as Narrative 1
DISTINCT ELEMENTS, DERIVED FROM EXPERIMENTAL MANIPULATION				
Protagonist (author of the thread) **MANIPULATED VARIABLE 1** (Emotional appeal: empathy with recipient *vs.* donor pride, based on **Kong**; **Lee**, 2021)	Juan, recipient of blood donations	Same as Narrative 1	Juan, blood donor	Same as Narrative 3
Feelings that the protagonist experiences **MANIPULATED VARIABLE 1** (Emotional appeal: empathy with recipient *vs.* donor pride, based on **Kong**; **Lee**, 2021)	- Fear - Hesitation in the face of the unknown - Gratitude for donations - Enthusiasm for life	Same as Narrative 1	- Pride in overcoming fear - Supported by family and health practitioners - Satisfaction in helping	Same as Narrative 3
Beneficiaries of donating from the reader's perspective **MANIPULATED VARIABLE 2** (Identifiable *vs.* generic or statistical victim, based on **Erlandsson** *et al.* 2015; **Van-Esch**, **Cui**; **Jain**, 2021)	'Your donation can save up to three lives'	'Your donation can save the lives of people like Pablo' (photo)	Same as Narrative 1	Same as Narrative 2

Perception of the leaders of the United States, the United Kingdom, and Spain in television conferences about Covid-19

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Abstract

The discourses of the political leaders about the Covid-19 pandemic have become central to many television networks. Many citizens follow these press conferences, as they can be affected by the government's measures against the virus. Due to its importance, analyzing how these individuals perceive their political leaders in these television appearances is relevant to determining their influence. Therefore, this study aims to analyze the perception of the ex-President of the United States (Donald Trump), the Prime Minister of the United Kingdom (Boris Johnson), and the President of the Government of Spain (Pedro Sánchez) in television conferences devoted to battling against the Covid-19 pandemic. After watching two videos of each leader, a gender-balanced sample of 360 citizens of these three countries (the United States, the United Kingdom, and Spain) evaluated the politicians' attractiveness, credibility, and persuasiveness as well as the influence of these factors on the public's attitude toward them and voting intention using an online survey. The results showed that the Spanish President, Pedro Sánchez, was considered the most attractive, credible, and persuasive leader with the most favorable attitude toward him and the highest voting intention, followed by the Prime Minister, Boris Johnson, and the American politician, Donald Trump. Therefore, the most physically and vocally attractive leader with the highest credibility and persuasiveness achieved the most favorable attitude and the highest voting intention. The most influential variables of the structural model analyzed in this study were persuasiveness and credibility, which mainly affected the attitude toward the politician and, to a lesser extent, voting intention.

Keywords

Communication; Political communication; Crisis communication; Perception; Physical attractiveness; Vocal attractiveness; Credibility; Persuasiveness; Attitude toward the politicians; Voting intention; Press conferences; Television; Politicians; Covid-19; Pandemics.

1. Introduction

During the Covid-19 pandemic, many presidents have given press conferences on television to inform the population about the situation and the measures applied to prevent the virus. These press conferences draw much attention, as citizens are directly affected by government measures. Therefore, these discourses significantly influence society. Most presidents use similar scenography, with a podium, patriotic symbols, and the country's flags behind them, which is a relevant political persuasion strategy (**Miles**, 2014). **Schaefer** (1997) called this strategy the "bully pulpit." **Kemmelmeier** and **Winter** (2008) showed that these symbols increase the feeling of nationalism among audiences. Therefore, as a persuasive resource to influence people, we examine in this study how citizens perceive these presidential press conferences on television.

As an analysis of all presidential speeches is unmanageable, we focus on only three leaders in this research. During selection, we looked for three countries strongly affected by the pandemic, with heads of state appearing in a similar television frame using the bully pulpit (behind the podium with the country's flags) and with no more than two languages (English and Spanish), as participants in this study had to understand them all. These leaders were the ex-President of the United States, Donald Trump; the British Prime Minister, Boris Johnson; and the Spanish President of the Government, Pedro Sánchez. This study aims to assess the attractiveness, credibility, and persuasiveness of these heads of state in television conferences about the pandemic and analyze the relationship between this perception and the attitude toward them and voting intention. To do so, we conducted an online survey wherein a sample of participants from these three countries (the United States, the United Kingdom, and Spain) evaluated the leaders' attractiveness, credibility, persuasiveness, as well as their attitudes toward them and voting intention after watching two videos of each politician.

Crises such as the coronavirus are when politicians play an essential role. Therefore, we aim to know how citizens of these countries perceive their political leaders in this Covid-19 pandemic. As far as we know, no studies have systematically analyzed these different variables in conjunction and their effect on attitudes and voting intention. Therefore, this research aims to fill this gap by conceiving a structural model of persuasion applied to politicians that shows the relevance of a compelling performance in press conferences to persuade citizens.

2. Politician's perception

Some studies in different countries have related traits such as attractiveness, credibility, or likability with attitude and voting intention (**Herrmann**; **Shikano**, 2016), among them in Great Britain (**Mattes**; **Milazzo**, 2014) and the United States (**Lenz**; **Lawson**, 2011). Attitudes can modify behavior and, hence, voting intention. Therefore, this study will analyze the perception of attractiveness, credibility, and persuasiveness and how these variables can affect the attitude toward politicians and voting intention.

2.1. Attractiveness

Attractiveness is an essential component of persuasion that affects people's perception (**Bailenson** *et al*., 2006; **Eagly**; **Chaiken**, 1975; **Kniffin** *et al.*, 2014) and influences political elections and electoral success (**Berggren**; **Jordahl**; **Poutvaara**, 2010; **Herrmann**; **Shikano**, 2016; **Mattes** *et al.*, 2010; **Mattes**; **Milazzo**, 2014; **Poutvaara**; **Jordahl**; **Berggren**, 2009; **Rosar**; **Klein**; **Beckers**, 2008). Due to the halo effect and the attractiveness stereotype, individuals ascribe more positive traits to attractive people of different races and ages (**Dion**, 2002). Therefore, attractive politicians are frequently assessed with more favorable evaluations (**Hart**; **Ottati**; **Krumdick**, 2011; **Nicholson** *et al.*, 2016; **Verhulst**; **Lodge**; **Lavine**, 2010). **Mattes** and **Milazzo** (2014) have shown that politicians with baby faces are perceived as less confident than those with mature ones. Moreover, **Berggren**, **Jordahl**, and **Poutvaara** (2010), comparing different surveys, concluded that politicians on the right-wing in Europe, the United States, and Australia looked more beautiful.

With physical appearance and gestures, vocal attractiveness is one of the main features of the leader prototype (**De-Groot** *et al.*, 2011). People expect some vocal attributes in a leader, and when expectations are not met, they are more likely to consider the speaker a bad leader (**Offermann**; **Kennedy**; **Wirtz**, 1994). **Zuckerman** and **Driver** (1989) characterized vocal attractiveness as a confident voice without tension. Regarding performance, speaker fluency and naturalness are among the main attributions (**Rodero**; **Mas**; **Blanco**, 2014; **Rosenberg**; **Hirschberg**, 2009). On the contrary, an unsuccessful speaker is hesitant, insecure, and monotonous (**Strangert**, 2005), while a fluent speaker will use a fast, smooth, and accurate pace (**Kormos**; **Dénes**, 2004).

Studies about voice have focused primarily on three main aspects: the volume or intensity, the tone of voice and intonation, and the speech rate or duration. Some authors have found that intensity or volume should be louder (**Rosenberg**; **Hirschberg**, 2009; **Yang** *et al*., 2020), intense, and energetic (**Rodero**; **Mas**; **Blanco**, 2014), as a loud voice sounds more present and confident. Regarding the tone of voice and intonation, there is a significant consensus. Most studies have shown that people prefer low-pitched voices for men and women, as they sound more attractive, credible, competent, dominant, and assertive (**Klofstad**; **Anderson**; **Peters**, 2012; **Rodero**; **Mas**; **Blanco**, 2014; **Tigue** *et al*., 2012). Moreover, **Klofstad**, **Anderson**, and **Peters** (2012) found that this preference affects voting intention. Some studies have characterized an expressive intonation as having a moderate pitch level and significant pitch range variations (**Hincks**, 2004; **Scherer**; **Klaus**; **Wolf**, 1973; **Strangert**, 2005; **Traunmüller**; **Eriksson**, 1995; **Yang** *et al*., 2020). Regarding rhythm and duration, some studies have concluded that a persuasive speaker should use a fast or, at least, faster speech rate than usual to be perceived as positive or charismatic (**Rosenberg**; **Hirschberg**, 2009; **Rodero**, 2020; **Yang** *et al*., 2020). The study by **Rodero** (2016) established that the optimal pace for improving cognitive processing was between 170 and 190 words per minute (wpm).

> This study analyzes the perception of attractiveness, credibility, and persuasiveness and how these variables can affect the attitude toward politicians and voting intention

In sum, vocal and physical attractiveness, among other nonverbal aspects, can help a leader be better perceived and improve attitude and voting intention. This idea allows us to posit the first hypothesis:

H1: The most attractive politician will achieve the most favorable attitude and voting intention.

2.2. Credibility

Attractiveness is related to credibility. Credibility is one of the most valuable outcomes in political communication (**Burgoon**; **Guerrero**; **Manusov**, 2016; **Chebat**; **Filiatrault**, 1987; **Chebat** *et al*., 2007; **Clark**; **Taraban**, 1991; **DeGroot** *et al*., 2011; **Mitchell**; **Ross**, 2013; **Offermann**; **Kennedy**; **Wirtz**, 1994; **Strach** *et al*., 2015). Some classic studies have found that one effective way to increase message persuasion is to enhance the speaker's credibility (**Hovland**; **Weiss**, 1951; **Maddux**; **Rogers**, 1980). Research related to political communication has demonstrated that the effectiveness of a politician depends on how trustworthy this leader is (**Burke** *et al*., 2007; **Dirks**; **Ferrin**, 2002).

> Attractiveness is an essential component of persuasion that affects people's perception and influences political elections and electoral success

Different visual and verbal expressions may lead the followers to believe that the politician is more credible. Attractive politicians are generally perceived as more competent, and this feature can predict more favorable impressions and modify voting intention. Moreover, the perception of source credibility is related to changes in attitudes (**Guyer** *et al*., 2019) and electoral success (**Laustsen**, 2014; **Olivola**; **Todorov**, 2010). Therefore, if politicians are considered credible, we can hypothesize that people will have a more favorable attitude toward them and a higher voting intention. This is our second hypothesis.

H2: The most credible politician will achieve the most favorable attitude and voting intention.

2.3. Persuasiveness

Both attractiveness and credibility are attributes related to persuasion affecting all aspects of the political sphere (**Mutz**, 1996). Persuasion is a significant process that influences people's mental states and attitudes (**O'keefe**, 2015). Persuasive communication tries to convince others to change attitudes or behavior (**Perloff**, 2020). Therefore, attitude and behavior are central constructs of persuasion. In this case, we can infer that citizens may perceive this leader as more persuasive if the politician is considered attractive and credible. Altogether, these factors can foster a more favorable attitude and voting intention. This is our third hypothesis.

H3: The most persuasive politician will achieve the most favorable attitude and voting intention.

2.4. Attitude and voting intention

The speaker's attitude can affect communication effectiveness and certain variables such as persuasion or credibility (**Brownlow**, 1992). According to **Spears** and **Singh** (2004), an attitude is an internal and enduring emotional state experienced by subjects in social situations. These attitudes are determined by body action, postures and gestures (**Dael**; **Mortillaro**; **Scherer**, 2012), facial expressions (**Ambadar**; **Schooler**; **Cohn**, 2005; **Barrett** *et al.*, 2019; **Ekman**; **Friesen**; **Hager**, 2002), and vocal expressions or prosody (**Cordaro** *et al.*, 2016; **Scherer**; **Klaus**; **Wolf**, 1973).

> Attractiveness and credibility are attributes related to persuasion

A vast amount of literature shows the effect of body language on political communication and attitude change (**Ahler** *et al.*, 2017; **Dumitrescu**, 2016). Some studies relate body language to changes in attitudes by modifying the perception of source attractiveness or credibility (**Guyer** *et al.*, 2019). This attitude can be more positive when speakers show interest by changing their facial and body gestures and position (i.e., eye contact, smiling, or leaning forward) (**Burgoon**; **Guerrero**; **Manusov**, 2016).

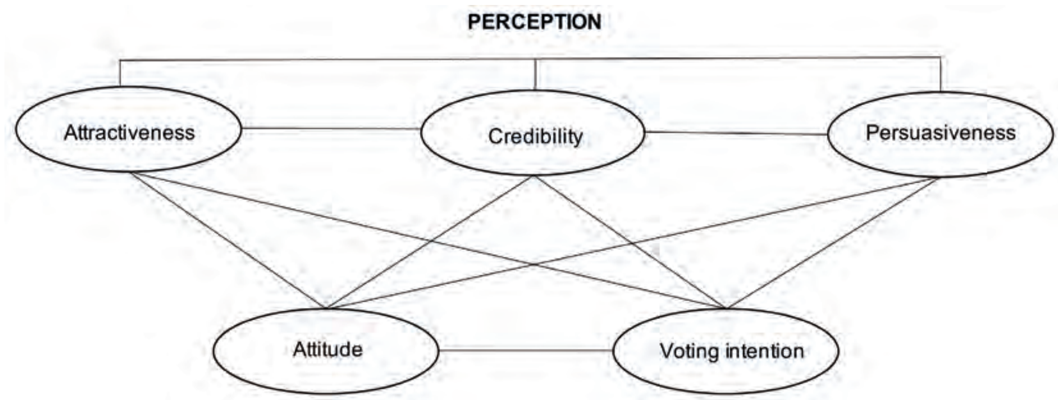

Figure 1. Structural model

Also, some research shows the effect of body language on voting intention (**Ahler** *et al.*, 2017; **Dumitrescu**, 2016). Traits such as attractiveness, credibility, or likability inferred through facial gestures can be related to voting intention (**Herrmann**; **Shikano**, 2016; **Lenz**; **Lawson**, 2011; **Mattes** *et al.*, 2010). Some authors have also found that low-pitched voices improve voting intention (**Klofstad**; **Anderson**; **Peters**, 2012; **Klofstad**, 2016; **Tigue** *et al.*, 2012). Figure 1 shows the theoretical model to test in this study.

3. Method

The survey was conducted over two weeks in April 2020 through a *Qualtrics* panel. The study was a mixed factorial design of 3 (leaders) by 2 (television discourses). These three variables were within-subject factors. There were two speeches by each politician (Trump, Johnson, and Sánchez). The order of the presentation was random.

3.1. Sample

The sample for the survey was composed of 360 people gender-balanced (182 women and 178 men). The criterium to be eligible was to understand English and Spanish at a high level. Participants who did not meet these criterium did not participate in the research.

There were three different groups in the sample according to the different countries. One hundred and twenty were Spanish, 120 were English, and 120 were American. Regarding the level of education, most of the sample were graduates (35%), followed by high school (33%), master's studies (15%), Ph.D. (13%), and elementary/middle school (4%). Concerning the socio-economic level, most of the sample was middle class (51%), followed by lower-middle (24%), upper-middle (13%), low (8%), and high class (4%). Regarding the ideological position, most of the sample (48%) was in the center, followed by left-wing (24%), right-wing (21%), extreme right (4%), and extreme left (3%).

3.2. Materials and stimuli

The interventions of these politicians were chosen with two criteria –the date and the scenography. The leaders had to appear in the press conferences with a similar television frame. We chose countries struck by the virus and with no more than two different languages, as the sample had to be competent in the two languages of the study: English and Spanish. These criteria led to selecting the ex-President of the United States (in 2020), Donald Trump; the English Prime Minister, Boris Johnson, and the Spanish President of the Government, Pedro Sánchez. With this election, gender comparison was also eliminated. All the videos were press conferences of the presidents to inform of the measures against the Covid-19. Two critical moments of the crisis were chosen: the end of March, when the heads of state took the most drastic measures, and the beginning of April (evolution of the actions against coronavirus). Figure 2 shows the politicians.

As the discourses were very long, we selected two fragments by each politician similar in scenography and content. Therefore, there were six videos in total. In the first discourse, the leaders provide recommendations to avoid the contagious and, in the second one, they praised the health services activity against the virus. These fragments were similar in extension, with 97 words for each politician (see Annex 1). Participants were exposed to the different video pieces in random order.

3.3. Variables of the study

The variables of this study were attractiveness, credibility, and persuasiveness and their influence on attitude toward the leaders and voting intention.

First, physical and vocal attractiveness were rated with two different 5-point scales. In the first one, respondents assessed to what extent this politician was physically attractive. In the second one, participants evaluated to what extent the politician's voice was attractive. The average of these two scales was the global level of attractiveness. The Cronbach Alpha coefficient was .79.

Figure 2. Pedro Sánchez, Boris Johnson and Donald Trump

The politician's voice was evaluated by measuring the three main parameters explained in the literature review: volume or intensity, tone of voice and intonation, and speech rate or duration. The intensity of the discourses was measured in decibels (dB). Regarding tone or pitch, there are two types of pitch variations in the intonation curve concerning voice tone: pitch level and range. The pitch level is the midline where the intonation is delivered, while the range is the difference between the highest and the lowest pitch level. Pitch range can indicate if the intonation is very monotonous (lower pitch range) or more varied (higher pitch range). Both parameters have been measured in hertz (Hz). Finally, speech rate was measured in words per minute.

> The variables of this study were attractiveness, credibility, and persuasiveness and their influence on attitude toward the leaders and voting intention

Secondly, this study focuses on credibility source attributed to the speaker –political or public figure– in a public speaking context (**McCroskey**; **Holdridge**; **Toomb**, 1974). We used the **McCroskey** and **Teven** (1999) credibility scale to evaluate this dimension (see Annex 2). The scale comprises three different constructs: competence, trustworthiness, and goodwill. These authors define competence as the perception of knowledge, expertise, and leadership abilities on a particular topic. The second variable is trustworthiness, understood as the perception of sincerity, character, and validity of the speaker's statements. Finally, the third component of the scale is goodwill which is the speaker's intention towards the listener: understanding, empathy, and responsiveness towards the speaker (**McCroskey**; **Teven**, 1999). The credibility level was the average of these three variables. The Cronbach Alpha coefficient of the scale was .85.

Third, the **Thomas**, **Masthoff**, and **Oren** (2017) scale was used to evaluate persuasiveness. This scale comprises four constructs: motivational, appropriate, effective, and convincing. The persuasiveness index was the average of these variables. For this scale, the Cronbach Alpha coefficient was .83.

Finally, we used two final scales to evaluate the attitude toward the politicians and the voting intention for each leader. Both were 5-point scales.

3.4. Procedure

First, participants had to choose the general language of the questionnaire, English or Spanish. Secondly, regardless of the demographics, participants had to answer some questions about the Covid-19 pandemic. The first question was about the measures they would carry out against coronavirus if they were the government. The second issue was if they agreed with the actions adopted by their respective governments against the pandemic. The third question was whether they agreed with the number of times the government's presidents gave conference press. We also asked about the impression of the three presidents. Participants evaluated the leaders on a 5-point scale from negative (1) to positive (5).

Finally, participants watched the videos of each politician and had to rate their attractiveness, credibility, and persuasiveness. At the end of the survey, they assessed the three different presidents' final attitude and voting intention.

4. Results

4.1. Previous questions about the Covid-19 pandemic

Questions about the coronavirus crisis formed the first part of the survey. The first question was about the measure they would carry out against coronavirus. Most of them (48%) defended a complete lockdown only with basic services working, followed by 21% who supported a lockdown only with minimum services to survive, 14% thought that it was necessary a lockdown only for risk people with all the services active, 13% defended a minimum lockdown with restrictions for few people as children and almost all the services, and 4% thought that it was not necessary to do anything against the virus. All the countries followed the same order.

The next question was if they agreed with the measures adopted by their respective governments. In this case, most of them (54%) agreed, followed by partially (32%) and do not agree (14%). All the countries maintained the same order.

The final question was whether the respondents agreed with the number of times the government presidents gave coronavirus information. In this case, most of the sample (40%) considered that the president of the government should appear before the media to explain all the measures that they take, followed by those (27%) that thought that the president only had to appear when they take important measures, 26% defended that the president had to explain the measures every day, and 7% considered that presidents never had to appear before media.

> Half of the respondents defended a complete lockdown only with basic services to contain the virus

4.2. Politicians' perception

The results of the politicians' perception of attractiveness, credibility, and persuasiveness are shown in Table 2.

Table 2. Perception of the politicians

Politician	Attractiveness		Physical attractiveness		Vocal attractiveness		Credibility		Persuasiveness	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***
Sánchez	3.95	.45	4.33	.62	3.57	.68	2.87	.91	2.86	.89
Trump	2.64	.37	2.75	.65	2.55	.58	2.45	1.02	2.46	1.01
Johnson	2.61	.52	2.23	.89	3.00	.67	2.67	.88	2.66	.84

Sánchez was the better evaluated in physical attractiveness, followed by Trump and Johnson. There were significant differences for politician, F (2, 358) = 1610, $p < .001$, partial $\eta^2 = .599$. There were no significant results for the different discourses in any variable.

The Spanish politician was the best rated in vocal attractiveness, F (2, 358) = 455.67, $p < .001$, partial $\eta^2 = .297$. The post hoc test showed significant differences among the three leaders in these two variables. In the two discourses, Sánchez used the loudest volume (73 decibels) compared to Trump (69 dB) and Johnson (66 dB), combined with a moderate speech rate (172 words per minute) faster than Johnson (117 wpm) but slower than Trump (176 wpm) and a dynamic intonation (107 hertz of difference) in front of the monotonous Trump (81 Hz) but moderate with respect to Johnson (151 Hz). Therefore, on balance, Sánchez used his voice in an effective way, according to the perception results.

Consequently, the Spanish leader was also the best evaluated in global attractiveness, F (2, 358) = 2056, $p < .001$, partial $\eta^2 = .656$, followed by Trump and Johnson. The post hoc test showed significant differences between Sánchez and the other politicians. There was a positive correlation between the physical and voice attractiveness: Pearson Correlation (r =.252, *Sig. (2-tailed)*: .000).

In credibility, there were significant differences for politician, F (2, 358) = 35.84, $p < .001$, partial $\eta^2 = .082$. The most credible leader was Sánchez, followed by Johnson and Trump (see Table 2). According to the post hoc tests, there were significant differences among the three politicians.

About persuasiveness, there were significant differences for politician, F (2, 358) = 35.39, $p < .001$, partial $\eta^2 = .032$. Sánchez was the most persuasive leader, followed by Johnson and Trump (see Table 2). According to the post hoc tests, there were significant differences among the three politicians.

Regarding attitude and voting intention, we also asked for the opinion about the different presidents assessed in this research at the beginning of the survey. The most positive impression was for the Spanish politician, Pedro Sánchez, followed by the Prime Minister, Boris Johnson, and in the last position, the ex-President of the United States, as shown in Table 3.

Table 3. Attitude toward the leader and voting intention

Politician	Previous attitude		Final attitude		Voting intention	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***
Sánchez	2.90	.90	4.19	1.60	1.96	.85
Trump	2.34	1.2	3.43	1.92	1.64	.85
Johnson	2.70	1.1	3.96	1.67	1.85	.86

The Spanish leader was better evaluated by English participants (M = 2.98; SD = .69), followed by American (M = 2.94; SD = .74), and Spanish respondents (M = 2.81; SD = 1.1). The Prime Minister, Boris Johnson, was better evaluated by the American subjects (M = 3.09; SD = .83), English participants (M = 3.06; SD = 1.1), and Spanish respondents (M = 2.07; SD = .92). Finally, the American politician achieved the best impression from the American participants (M = 2.88; SD = 1.4), followed by English subjects (M = 2.44; SD = 1.1), and Spanish respondents (M = 1.81; SD = .99).

Also, participants had to rate their attitude toward the leaders again after watching the videos at the end of the survey. The data were significant for politician, F (2, 358) = 36.08, $p < .001$, partial $\eta^2 = .032$. As in the previous evaluation, the best score was for Sánchez, followed by Johnson and Trump. The post hoc tests showed significant differences among the three politicians. As shown in Table 3, the participants' final attitude toward the leaders was higher than the initial one, especially in the case of Sánchez (1.29) and Johnson (1.26 higher), followed by Trump (1.09).

Regarding voting intention, the data were significant for politician, F (2, 358) = 25.96, $p < .001$, partial $\eta^2 = .024$. Sánchez obtained the highest score, followed by Johnson and Trump (see Table 3). The post hoc tests showed significant differences among the three politicians.

> The most attractive, credible, and persuasive politician, the Spanish leader, achieved the most favorable attitude and the highest voting intention

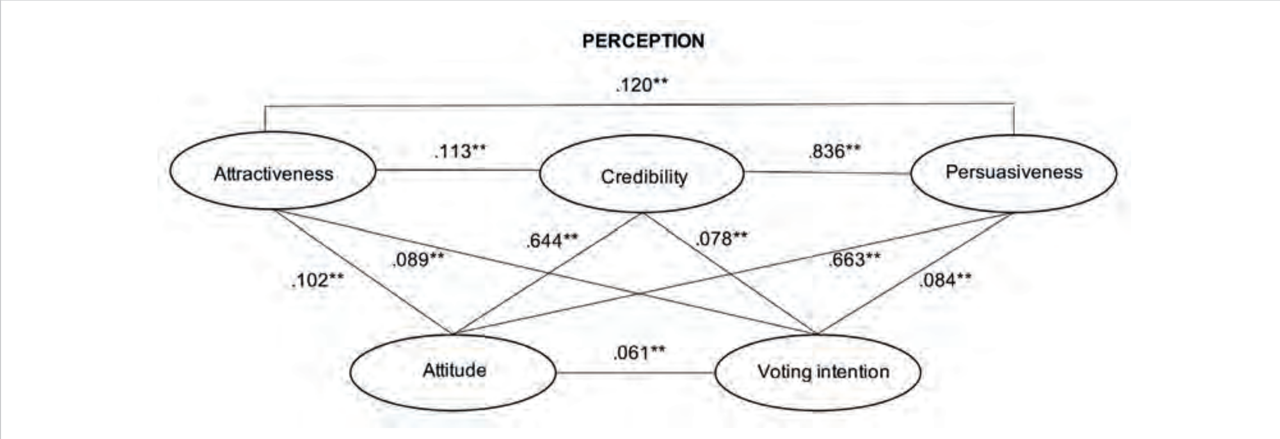

Figure 3. Final structural model **$p < .001$

4.4. Hypotheses testing

Hypothesis 1 posited that the most attractive politician would achieve the most favorable attitude and voting intention. The results confirmed this hypothesis, as Sánchez was considered the most attractive politician, and this leader achieved the most favorable attitude and the highest voting intention. Moreover, there was a positive correlation between the global attractiveness and attitude toward the politician and between the attractiveness and voting intention (see Figure 3).

Hypothesis 2 established that the most credible politician would achieve the most favorable attitude and voting intention. This hypothesis is also confirmed, as the most credible politician, the Spanish governor, achieved the most favorable attitude and voting intention. Furthermore, there was a correlation between credibility, attitude toward the politician, and voting intention (see Figure 3).

Finally, Hypothesis 3 of this study was that the most persuasive politician would achieve the most favorable attitude and voting intention. The results of this variable confirm this hypothesis. The most persuasive politician, the Spanish leader, achieved the most favorable attitude and voting intention. In this case, there was a positive correlation between persuasiveness with attitude toward the politician and voting intention. Figure 3 shows the final structural model with the correlations.

5. Discussion and conclusions

This study examined the attractiveness, credibility, and persuasiveness of the politicians –Donald Trump (United States), Boris Johnson (United Kingdom), and Pedro Sánchez (Spain)– in television press conferences about the coronavirus pandemic and their relationship to attitudes and voting intention.

Regarding the evaluation of the pandemic, half of the respondents defended a complete lockdown only with basic services to contain the virus. Moreover, most of them agreed with the measures adopted by their respective governments and thought that governors should appear before the media to explain all the measures they took against the Covid-19.

Regarding the politicians' perception, the results showed that the most attractive, credible, and persuasive politician, in this case, the Spanish leader, achieved the most favorable attitude and the highest voting intention. The variables of this study were positively correlated, especially credibility and persuasiveness (with the most important relationship), followed by attitude with persuasiveness and attitude with credibility. Therefore, these results confirm the structural model tested in this study.

> The most physically and vocally attractive leader (Sánchez) was also the most credible and persuasive politician, followed by Johnson and Trump

Concerning attractiveness, the Spanish governor was rated as the most physically attractive politician, followed by Trump and Johnson. Sánchez has been qualified as a handsome politician in Europe (**Heller**, 2018) and in the United States, a country in which he has been considered a very "good-looking man," even compared to Kennedy or Superman (*ThinkSpain*, 2021). Therefore, the result of this study is not surprising. The second position was for the American politician. Trump has been considered a sexy man by many women (**Dolan**, 2016). The last position was for Boris Johnson. The English Prime Minister's style has frequently been criticized due to his messy hair (**McInnes**, 2021). In consequence, the most physically attractive leader achieved the best results in the rest of the variables, in line with the halo effect and different previous studies that have shown changes in the attitude and electoral success (**Ahler** *et al.*, 2017; **Berggren**; **Jordahl**; **Poutvaara**, 2010; **Dion**, 2002; **Hart**; **Ottati**; **Krumdick**, 2011; **Herrmann**; **Shikan**, 2016; **Mattes**; **Milazzo**, 2014; **Nicholson** *et al.*, 2016; **Rosar**; **Klein**; **Beckers**, 2008; **Verhulst**; **Lodge**; **Lavine**, 2010).

Also, respondents considered that Sánchez had the most attractive voice, followed by Johnson and Trump. According to some research, the attributes found in Sánchez's voice were those that better characterize vocal attractiveness (**Klofstad**; **Anderson**; **Peters**, 2012; **Rodero**; **Mas**; **Blanco**, 2014; **Rosenberg**; **Hirschberg**, 2009; **Strangert**, 2005). As some studies have shown that a good voice can influence voting behavior, it is logical that Sánchez was the politician with a more favorable attitude and voting intention (**Tigue** *et al.*, 2012). However, attractiveness was the variable with the weakest relationship with the rest of the features. The strongest correlation was with persuasiveness, then credibility, and voting intention.

Regarding the attitude toward the leader and voting intention, the final order was the same as in the other variables: Sánchez, followed by Johnson and Trump

The most physically and vocally attractive leader (Sánchez) was also the most credible politician, followed by Johnson and Trump. These results showed that a leader perceived as attractive is also perceived as competent and trustworthy (**Dirks**; **Ferrin**, 2002). These outcomes are valuable in political communication (**Mitchell**; **Ross**, 2013; **Strach** *et al.*, 2015) and can predict electoral success (**Laustsen**, 2014; **Olivola**; **Todorov**, 2010), as this study has also demonstrated. The most credible politician attained the most positive attitude and the highest voting intention. Moreover, credibility was strongly correlated with other variables, especially with persuasiveness. Therefore, the more persuasive the leader was perceived, the more credible the politician was.

Both attractiveness and credibility affected persuasiveness, especially credibility (**Mutz**, 1996). The most attractive and credible politician was also perceived as the most persuasive (**O'keefe**, 2015; **Perloff**, 2020). As in the other variables, Sánchez was followed by Johnson and Trump. This result aligns with previous studies showing that a persuasive speaker should be considered trustworthy (**Clark**; **Taraban**, 1991; **Rosenberg**; **Hirschberg**, 2005). In fact, persuasiveness was the most influential variable in this study, with the strongest correlation with credibility. Therefore, the more credible the politician was perceived, the more persuasive the leader was.

Regarding the attitude toward the leader and voting intention, the final order was the same as in the other variables: Sánchez, followed by Johnson and Trump. Participants improved their attitude toward the leaders after watching the videos, especially Sánchez, followed by Johnson and Trump. Therefore, they generated a more favorable perception of the stimuli, which fostered a more positive attitude toward these politicians. The strongest correlations of this variable were with persuasiveness and credibility; thus, the more persuasive and credible the politician was perceived, the more favorable attitude toward him.

In the case of voting intention, the strongest correlations were, in this order, with attractiveness, persuasiveness, and credibility; thus, the more attractive, persuasive, and credible the leader was, the higher the voting intention. It is worthwhile to note that attractiveness was not a very influential variable in attitude but was in voting intention, according to some studies that have shown its relationship with political elections and electoral success (**Ahler** *et al.*, 2017; **Berggren**; **Jordahl**; **Poutvaara**, 2010; **Herrmann**; **Shikano**, 2016; **Mattes**; **Milazzo**, 2014).

In conclusion, the most important variables in the structural model were persuasiveness and credibility, which mainly influenced attitude toward the politician (**O'keefe**, 2015; **Perloff**, 2020). Furthermore, both variables with attractiveness determined voting intention, but to a lesser extent.

All in all, we can conclude that the most physical and vocal attractive leader with the highest credibility and persuasiveness achieved the most favorable attitude and the highest voting intention. Therefore, a good part of the leaders' political success is based on being perceived as attractive (not only physically but also vocally), but especially on being considered credible and persuasive.

The most important variables in the structural model were persuasiveness and credibility, which influenced attitude toward the politician and voting intention

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Annexes

1. Scripts of the videos

Donald Trump

Video 1

English: To keep new cases from entering our shores, we will be suspending all travel from Europe to the United States for the next thirty days. This is the most aggressive and comprehensive effort to confront a farm virus in modern history.

Spanish: Para evitar que entren nuevos casos en nuestro país, vamos a suspender todos los viajes desde Europa a Estados Unidos durante los próximos treinta días. Se trata del esfuerzo más agresivo y exhaustivo para hacer frente a un virus de granja en la historia moderna.

Video 2

English: The number one priority from our standpoint is the health and safety of the American people and that's the way I viewed it when I made that decision. Because of all we've done, the risk to the American people remains very low. We have the greatest experts in the world, really in the world, right here.

Spanish: La prioridad número uno desde nuestro punto de vista es la salud y la seguridad del pueblo estadounidense y así lo consideré cuando tomé esa decisión. Gracias a todo lo que hemos hecho, el riesgo para el pueblo estadounidense sigue siendo muy bajo. Tenemos a los mejores expertos del mundo, literalmente del mundo, aquí mismo.

Boris Johnson

Video 1

English: Now it is the time for everyone to stop nonessential contact with others and to stop all unnecessary travel. We need people to start working from home where they possibly can. And you should avoid pubs, clubs, theaters and other such social venues.

Spanish: Ahora es el momento de que todo el mundo detenga el contacto no esencial con los demás y detenga todos los viajes innecesarios. Necesitamos que la gente empiece a trabajar desde casa siempre que pueda. Y debe evitar los pubs, clubes, teatros y otros lugares sociales de este tipo.

Video 2

English: Keeping the country safe is the government's overriding priority and our plan means we're committed to doing everything possible based on the advice of our world leading scientific experts to prepare all eventualities. And let's not forget we already have a fantastic *NHS* fantastic testing systems and fantastic surveillance of the spread of the disease.

Spanish: Mantener la seguridad del país es la principal prioridad del gobierno y nuestro plan significa que nos comprometemos a hacer todo lo posible, basándonos en el consejo de nuestros expertos científicos líderes en el mundo, para preparar todas las eventualidades. Y no olvidemos que ya tenemos un fantástico sistema de pruebas del *NHS* y una fantástica vigilancia de la propagación de la enfermedad.

Pedro Sánchez

Video 1

Spanish: La declaración del estado de alarma permite movilizar al máximo los recursos materiales para combatir el virus. La victoria depende de cada uno de nosotros en nuestro hogar, nuestra familia, en el trabajo, en nuestro vecindario. El heroísmo consiste también en lavarse las manos.

English: The declaration of the state of alert allows the maximum mobilization of material resources to combat the virus. Victory depends on each of us at home, in our families, at work, in our neighborhoods. Heroism is also about washing your hands.

Video 2

Spanish: Reconozco con humildad nuestras limitaciones como las del resto de países para afrontar esta pandemia. Pero nos tenemos a nosotros mismos como sociedad, como comunidad. Tenemos el trabajo constante y el asesoramiento científico de los mejores profesionales a los cuales quiero volver a rendir tributo, y la absoluta determinación política por superarlas.

English: I recognize with humility our limitations as well as those of the rest of the countries to face this pandemic. But we have ourselves as a society, as a community. We have the constant work and scientific advice of the best professionals to whom I would like to pay tribute once again, and the absolute political determination to overcome them.

Annex 2. Scale of credibility

Competence								
Intelligent	1	2	3	4	5	6	7	Unintelligent
Untrained	1	2	3	4	5	6	7	Trained
Inexpert	1	2	3	4	5	6	7	Expert
Informed	1	2	3	4	5	6	7	Uninformed
Incompetent	1	2	3	4	5	6	7	Competent
Bright	1	2	3	4	5	6	7	Stupid
Goodwill								
Cares about me	1	2	3	4	5	6	7	Doesn't care about me
Interests at heart	1	2	3	4	5	6	7	Not interests at heart
Self-centered	1	2	3	4	5	6	7	Not self-centered
Concerned with me	1	2	3	4	5	6	7	Unconcerned with me
Insensitive	1	2	3	4	5	6	7	Sensitive
Not understanding	1	2	3	4	5	6	7	Understanding
Trustworthiness								
Honest	1	2	3	4	5	6	7	Dishonest
Untrustworthy	1	2	3	4	5	6	7	Trustworthily
Honorable	1	2	3	4	5	6	7	Dishonorable
Moral	1	2	3	4	5	6	7	Immoral
Phoney	1	2	3	4	5	6	7	Genuine

Speakers' expressions before and in a public presentation. Pleasantness, emotional valence, credibility, and comprehension effects

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Abstract

When a speaker engages in public speaking, the expression shown while delivering the speech determines the effectiveness of the communication and can be very influential in organizational settings. However, in public speaking, the audience can often see the speaker before the presentation begins. Therefore, the public could hypothetically gain an impression on the basis of the speakers' expressions even before performing the presentation. With this idea in mind, the goal of this research is to analyze the influence of speakers' expressions before delivering a speech and during the presentation. The study included two brown-haired/dark-eyed male and female and two blonde-haired/blue-eyed male and female presenters to investigate the effect of appearance and gender. A total of 200 participants looked at the speakers' pictures with five different expressions before delivering the speech. They then watched videos with the same speakers and similar expressions while delivering the speech. The results showed that happiness was the most pleasant and positive expression, followed by confidence, indifference, shyness, and anger, when the participants watched the speakers before the presentation. However, confidence was considered the most pleasant, credible, and comprehensible expression, followed by happiness, anger, shyness, and indifference, while giving the speech. In both cases, female presenters were perceived as the most pleasant, and brown-haired/dark-eyed speakers were considered the most pleasant, credible, and comprehensible. The speakers' expressions were perceived as more intense before the speech than during the discourse. This line of research helps understand the influence of these two crucial moments in presentations, and the results may be transferred into practice for public speaking training.

Keywords

Expressions; Pleasantness; Credibility; Emotional valence; Comprehension; Appearance; Gender; Oral presentations; Speakers; Discourses.

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1. Introduction

The relevance of public speaking in the professional, social, and personal spheres is unquestionable (**Bailey**, 2019). The speaker's expression can affect some of the most relevant communication outcomes, namely valence, likeability, pleasantness, credibility, and speech comprehension (**Brownlow**, 1992). In particular, the speaker's expression can be relevant for leader outcomes in organizational settings (**Bakker-Pieper**; **De-Vries**, 2013; **Sagie**, 2009). Besides, research on how gender and physical appearance are perceived in a public speaking context can be very informative about prejudices and stereotypes theory while providing evidence upon which to develop mechanisms to counter and address these discriminatory outcomes in many different situations (**Cassidy** *et al.*, 2019; **Ritchie**; **Palermo**; **Rhodes**, 2017). The expression communicated in public speaking –informed by a wide range of gestures, body language and oral skills along with the speaker's physical appearance and gender– is crucially intertwined with important communication, management, and leadership outcomes (**Men**; **Yue**; **Liu**, 2020).

> Public speaking anxiety is largely caused by a prior representation of the act of public speaking and how the speaker will be perceived

Studies on public speaking have usually focused on verbal traits and facial expressions during the delivery phase (**Brownlow**, 1992; **Rodero**, 2022; **Tcherkassof** *et al.*, 2007). However, the physical behavior before delivering the speech, i.e., while waiting to be settled and ready, while being introduced, and particularly the few seconds before the verbal onset, can be relevant, too. **Bodie** (2010) found that public speaking anxiety is to a great extent caused by a prior representation of the act of public speaking and how it will be perceived, which can lead to the expression of emotions such as anger, related to fear and threat or the expression of personality trait shyness as a degree of extraversion. The anticipation of public speaking is the driver to have an angry expression, which enhances the processing of anger and inhibits the processing of happy and neutral faces (**Wieser** *et al.*, 2010).

Nonverbal behavior before delivering the speech can be a fertile field of study, mainly since most research on public speaking expressions has focused on verbal traits and facial expressions during the delivery phase (**Brownlow**, 1992; **Rodero** *et al.*, 2022; **Tcherkassof** *et al.*, 2007). In addition, little research has focused on how hand gestures and body movement enhance confidence and counter shyness and anger before and during speech delivery (**Hancock** *et al.*, 2010; **Pereira-dos-Santos** *et al.*, 2020). Previous research has usually focused on the experimental perception of specific elements of the public speaking training programs –eye contact, smiling, and specific hand gestures synchronized with vocal stress (**Bull**; **Connelly**, 1985; **Hancock** *et al.*, 2010), among others, from disciplines such as education, or business. However, **Bakker-Pieper** and **De-Vries** (2013) have shown how expressive communication styles influence leadership perception over personality traits. Expressions in public speaking can thus be considered overall emotional categories crucial for social interaction that comprises a wide range of spontaneous nonverbal behaviors (**Bailey**, 2019; **Calvo**; **Lundqvist**, 2008; **Eisenbarth**; **Alpers**, 2011).

This study focuses on the speakers' expressions before the onset of the delivery phase and during the delivery phase in public speaking (**Hoemann** *et al.*, 2019; **Strangert**; **Gustafson**, 2008; **Wichmann**, 2000). Our main research question is: How does the speaker's expression, physical appearance, and gender before and during public speaking influence pleasantness, emotional valence, credibility, and comprehension? To answer this question, we examined five expressions of high relevance for communication effectiveness in a public speaking context –happiness, confidence, indifference, shyness, and anger– as performed by brown-haired/dark-eyed male and female speakers, and blonde-haired/blue-eyed male and female speakers.

The findings can contribute to understanding how these two moments of presentations: static (previous) or dynamic (during the speech), impact the first impression of the speaker before the speech, or a more conscious comprehension-driven interpretation of the speaker during the speech delivery. This line of research may foster further studies on these two mechanisms, and the results may be easily transferred into practice for public speaking training and leadership communication in organizational settings.

1.1. Speaker's expressions

An expression is the physical appearance of emotional states experienced by individuals in social situations at different levels: cognitive, physiological, affective, and behavioral. More specifically, speakers' expressions can be comprehensively defined as unambiguous consistent emotional states determined by body action, postures, and gestures (**Dael**; **Mortillaro**; **Scherer**, 2012), static facial expressions (**Barrett** *et al.*, 2019; **Ekman** *et al.*, 2002), dynamic facial expressions (**Ambadar** *et al.*, 2005), gaze (**Sander** *et al.*, 2007), vocal expression (**Juslin**; **Laukka**, 2003; **Scherer**, 1986) and prosody

(**Cordaro** *et al.*, 2016), all of which listeners perceive differently. A manifold of contextual, professional, and personal factors can make the speaker show different expressions while waiting to start the speech or during speaking. Public speaking anxiety and its converse, public speaking confidence, have been intensively studied in many different contexts. As it will be seen next, no research has focused on how this phenomenon can make the speaker show different expressions that reflect the sum of situational factors, emotions, and even personality traits, which can be used to build leadership through relevant communication effects.

> Confidence in public speaking is often associated with a professional performance in terms of voice use, hand gestures, and body movement

Situational expressions are thus used for social and communication purposes and are generally perceived as positive or negative with different degrees of intensity. For instance, there are facial and body prototypes determined by the expressions of the speaker: happy (smile, cheek raise, perceived eye size and narrowing of the eye-opening), angry (lips tightened, brows furrowed, widened eyes), surprised (eyebrows raised, upper eyelid raised, lips parted, jaw dropped), or scared (eyebrows raised and pulled together, upper eyelid raised, lower eyelid tense, lips parted and stretched) (**Barrett** *et al.*, 2019; **Glazer**, 2017).

In an experiment on how some emotional expressions were perceived, **Keltner** *et al.* (2019) associated trustworthiness with the authenticity of expression, mainly referring to smiles, anger with dominance perception, embarrassment with upstanding character perception, distress with sympathy, and fear with a threat. **Keltner** *et al.* (2019) also showed that emotional expressions could be recognized with a few vocal sounds. And **Juslin** and **Laukka** (2003) found that participants could consistently categorize (70% rate) five primary expressions by just hearing the voice (happiness, anger, sadness, tenderness, fear). On the one hand, **Guyer** *et al.* (2021) have demonstrated that vocal pitch can influence attitudes and persuasion especially as an indicator of confidence. Confidence and the expressions of happiness would raise credibility and pleasantness (**Kröger** *et al.*, 2010; **Glazer**, 2017; **MacIntyre**; **Thivierge**, 1995). Conversely, a solid stream of research has focused on how personality and social and cultural factors may lead to public speaking anxiety and hinder communication (**Horwitz**, 2001). Importantly, introversion can lead to public speaking fear and anxiety associated with the listeners' negative feelings, low pleasantness, and low credibility, which in turn feeds back into the speakers' fear, anxiousness, and anger in a spiral form. Shyness can be a personality but also a situational trait; thus, it can be associated with situations requiring a social performance, leading to anxiety, or speaking fear or phobia (**Hancock** *et al.*, 2010). Furthermore, research shows that shy people score higher in the negative elements of public speaking, such as stiffness, tension in hands and arms, or inadequate body posture (keeping head and shoulders low or lacking expressiveness) (**Pereira-dos-Santos** *et al.*, 2020).

On the other end of the spectrum, the expression of confidence can render positive outcomes (such as a well-organized interesting engaging presentation) in public speaking (**McNatt**, 2019) and is closely related to the expression of happiness –the typical gaze and smile of interaction (**Beukeboom**, 2009). Confidence is usually associated with quality performance concerning the use of voice, hand gestures, and body movement (**McNatt**, 2019) and strongly opposes anxiety, which could lead to the expression of anger or shyness. The study by **Dimberg** and **Thunberg** (2007) rated happy faces as pleasant and angry faces as unpleasant, especially for those participants that scored high in speech anxiety. Therefore, the expressions of confidence and happiness are expected to be assessed positively, as opposed to anger and shyness (**Barrett** *et al.*, 2019; **Wichmann**, 2000; **Wieser** *et al.*, 2010).

We can thus presume that a better evaluation of confidence and happiness can be applied to both phases of the public speaking performance, before and during the speech. Consequently, our first hypotheses are the following:

H1.1. Happiness and confidence will be the expressions with a more pleasant perception, positive valence, and less negative valence than other expressions before speech delivery.

H1.2. Happiness and confidence will be the expressions with a more pleasant perception, positive valence, less negative valence, higher speaker credibility, and more speaker discourse comprehension than other expressions during speech delivery.

Regarding the differences in the perception of the speakers' expressions before and during speech delivery, the scarcity of research and insights prevents us from posing a well-grounded hypothesis. Yet the perception of exclusively physical behavior before the speech (expecting it) by the listeners is reasonably expected to bear differences with the more dynamic physical and vocal behavior while delivering the speech. The speakers' expressions will be inferred before speech delivery with more static elements than during speech delivery since the speaker is just waiting to start talking (**Ekman** *et al.*, 2002; **Tcherkassof** *et al.*, 2007). As in a static image, individuals have fewer nonverbal features to infer an expression when staring at the waiting figure of the speaker; hence we can deduce that perception could be more straightforward and less ambiguous, with no interplay from other variables –especially the speech onset and content. In other words, message redundancy and consistency are more easily achieved with a static image and no vocal behavior involved than with a dynamic message with physical and vocal behavior. Yet, again, we are comparing two substantially different outcomes here: a timeless, simple sensory outcome versus an encapsulated dynamic message. As there is no previous research that points to how these expressions will be more intensely perceived, we pose this research question:

Q1. What will be the differences in perception before and during speech delivery?

1.2. Speaker's gender

Gender differences in communication are sometimes due to the social roles historically assigned to men and women (**Lakoff**, 1973). These roles are strongly determined by a social hierarchy in which men dominate. Social role theories have thoroughly described and theorized the normative qualities and behaviors of men and women and act as reinforcers of the social hierarchy that places men in a dominant position (**Glick** *et al.*, 2004; **Sidanius**; **Pratto**, 1999). According to the "Role congruity theory of prejudice toward female leaders" (**Eagly**; **Karau**, 2002), gender roles are perpetuated by the stereotyped social perception of women being less capable of performing leadership roles (such as being the leader or the main speaker in a public speaking context) and by being assessed less positively than men when doing so. This discriminatory mechanism defines women as attention-givers and men as attention-getters, thus men can be perceived as more trustworthy, intelligent, and credible than women (**Kenton**, 1989). In general, research has found eventual gender bias to like women more than men and to regard women as less powerful than men, to some extent, regardless of gestures and body postures (**Bailey** *et al.*, 2020).

Gender studies have elaborated on the complexity of gender discrimination, as the patriarchy is also supported by the so-called benevolent sexism or the women-are-wonderful effect (**Eagly**; **Mladinic**, 1994), which predisposes listeners to like the stereotyped woman over the stereotyped man (**Bailey** *et al.*, 2020; **Glick** *et al.*, 2004). Following this rationale, audiences may show more condescension when a man rather than a woman shows anger and when a woman rather than a man shows shyness. However, the compensation/ceiling effect entails that anger in men would be considered too much and assessed negatively and that shyness would not be acceptable for men. Further, **Hack** (2014) found bias in the case of smiling women being rated as warm and more competent speakers, whereas there were no differences between smiling and non-smiling men.

> Gender roles are perpetuated by the stereotyped social perception of women being less capable of performing leadership and by being assessed less positively than men

In sum, there is evidence of a gender bias applied to public speaking (**Bailey** *et al.*, 2020; **Hack**, 2014; **Jokisch** *et al.*, 2018). We therefore can expect moderate differences favoring men over women in both situations, before and during delivering the presentation (**Leaper**; **Robnett**, 2011).

H2.1. Male speakers in different expressions will be perceived as more pleasant and positive than their female counterparts before speech delivery.

H2.2. Male speakers in different expressions will be perceived as more pleasant, positive, credible, and comprehensible than their female counterparts during speech delivery.

1.3. Speaker's physical appearance

The perception of the speakers' expressions may also be moderated by their physical appearance. Personal appearance is perceived and elaborated through impression formation, such as the maturity and credibility of faces (**Brownlow**, 1992) or long-lasting personality traits (**Petrican** *et al.*, 2014) and leadership associated with facial appearance (**Antonakis**; **Eubanks**, 2017). Physical appearance first impression is a type of judgment made rapidly, non-consciously, spontaneously, with minimal information, and with no training based on general face patterns (**Ritchie** *et al.*, 2017; **Zebrowitz**, 2017). Appearance has traditionally been a discriminatory mechanism mainly determined by sex, class, and racial appearance. In this regard, the patriarchy is associated with the dominant position of the WASHP male pattern (White, Anglo-Saxon, Heterosexual, and Protestant). The traditional work by **Berne** (1959) established how different folklores in the world had associated pureness, loveliness, duty, and beauty with blonde hair and blue eyes as opposed to dark complexion. The rationale is the following: the first impression mechanism is based on a rapid inference with little attention and cognitive resources, which is used by communication practitioners, particularly in advertising, to communicate efficiently with little message's structural resources and little audience's mental resources. The use of stereotypes and prejudicial behaviors based on general traditional standards, patterns and routines follows this rationale. The blonde-haired/blue-eyed male and female pattern would thus be a universal beauty and cultural standard coincident with the Western, White, and Anglo-Saxon most common features. From an evolutionary approach to leadership theory, this pattern has been stablished historically based on associating the cultural concept of attractiveness with leadership (**Van-Vugt**; **Grabo**, 2015). However, as there is no conclusive research analyzing the perception of hair and eyes appearance differences in public speaking, we pose our second research question:

Q2. What will be the influence of physical appearance (blonde-haired/blue-eyed male and female presenters and brown-haired/dark-eyed speakers) before and during speech delivery?

2. Method

2.1. Design

The design was a five (expressions) by two (physical appearance) by two (gender) within-subjects experiment. Participants answered an online survey in which they rated 20 images (before presentation) and 20 videos (during the speech). The order of presentation was randomized and combined to represent all expressions by all the speakers.

2.2. Stimuli

Professional actors and actresses were hired and selected to represent the gender and physical appearance of the population. To choose the speakers, we conducted a pre-test to measure the acceptance of twelve presenters based on their appearance: three blonde-haired and blue-eyed females and males (six total), and three dark-haired and brown-eyed female and male speaker's pictures (six total) were tested. We looked for average pleasant looking people, neither extraordinary good looking, nor very bad rated. All twelve pictures were designed with the same position in a medium close-up shot. A sample of 60 students was asked to rank on a 7-point scale how pleasant they found each person. Only one picture in each category passed the medium score, so the best-rated pictures of each category were selected for the final experiment. These selected speakers were asked to pose for the pictures and perform five different expressions in short video presentations.

> Four professional actors and actresses were selected to represent the gender and physical appearance of the population

We took twenty pictures of the four speakers with five different expressions for the first part of the study. The chosen place was a professional television and photography set to guarantee maximum quality. The conditions were stable with equal lighting conditions and plain blue chroma. The order of the different expressions and speakers was randomized. Figure 1 is an example that shows all the expressions and speakers.

Figure 1. Speakers' expressions

Gestures, body, and facial expressions were applied to represent every expression. As shown in Figure 1, the speaker (A) expresses confidence. Her arms are open and her palms up. She makes eye contact and is smiling. Speaker (B) shows indifference posing with her arms on the back and her gaze lost up in the air. Speaker (C) poses with anger. His arms are crossed, his body looks tense and straight, and he has an angry face with a threatening look. Speaker (D) expresses shyness. He holds his hands in the front, his body posture is shrunk, and his head and gaze point to the floor. Speaker (E) shows happiness. His arms are in a relaxed position along his body. His body also looks relaxed; he is smiling and establishing eye contact. The way of expressing each emotion through body language stayed constant through speakers. To do so, we showed them a model they had to follow.

For the second part of the study, a total of twenty videos were recorded by the same five speakers delivering the same short neutral message about the Amazonas (5 seconds). Each video had the same duration and was recorded by each speaker representing the same five expressions (happiness, confidence, indifference, shyness, and anger). Speakers were asked to perform them by following a model. The shooting set was the same for pictures, with equal lighting conditions and plain dark blue chroma. All the speakers used the same professional lavalier microphone. In both cases, images and videos, all the speakers were dressed in shirts and trousers in similar colors (white and grey). There were no significant differences by clothes, F (3,107) = .924, p = .339.

Vocal cues were controlled and measured by Praat software (**Boersma**; **Weenink**, 2021) to stay constant in-between speakers. We performed an acoustic analysis for every expression and speaker analyzing the tone and intensity averages and range variations. An ANOVA was conducted to analyze differences on vocal performance for each expression among speakers. There were no significant differences in vocal tone variation among speakers in any of the expressions: happiness, F (4,16) = .919, p < .439; confidence, F (4,16) = .698, p < .491; indifference, F (4,16) = .357, p < .611; shyness, F (4,16) = .083, p < .801, and anger, F (4,16) = .618, p < .514. Moreover, there were no significant differences in intensity variation in any of the expressions: happiness, $F(4, 16) = 1.385$, $p < .360$; confidence, $F(4, 16) = .036$, $p < .866$; indifference, $F(4, 16) = 6.40$, $p < .127$; shyness, $F(4, 16) = 2.00$, $p < .293$ and anger, $F(4, 16) = 2.390$, $p < .262$. Table 1 presents the tone and intensity values.

Table 1. Acoustic analysis of voices

Speakers' expressions	Speaker	Average tone	Tone variation	Average intensity	Intensity variation
Happiness	Female dark eyes and hair	192 Hz	172 Hz	73 dB	42 dB
	Female blue eyes and blonde	178 Hz	172 Hz	65 dB	37 dB
	Male dark eyes and hair	186 Hz	168 Hz	71 dB	37 dB
	Male blue eyes and blonde	167 Hz	151 Hz	73 dB	36 dB
	Mean	180 Hz	165 Hz	70 dB	38 dB
Confidence	Female dark eyes and hair	166 Hz	115 Hz	65 dB	41 dB
	Female blue eyes and blonde	149 Hz	144 Hz	59 dB	29 dB
	Male dark eyes and hair	134 Hz	106 Hz	59 dB	38 dB
	Male blue eyes and blonde	127 Hz	108 Hz	65 dB	55 dB
	Mean	144 Hz	118 Hz	62 dB	40 dB
Indifference	Female dark eyes and hair	142 Hz	99 Hz	142 dB	24 dB
	Female blue eyes and blonde	153 Hz	106 Hz	153 dB	36 dB
	Male dark eyes and hair	99 Hz	50 Hz	99 dB	30 dB
	Male blue eyes and blonde	111 Hz	77 Hz	111 dB	34 dB
	Mean	126 Hz	83 Hz	126 dB	31 dB
Shyness	Female dark eyes and hair	144 Hz	85 Hz	62 dB	37 dB
	Female blue eyes and blonde	157 Hz	111 Hz	60 dB	33 dB
	Male dark eyes and hair	122 Hz	73 Hz	60 dB	35 dB
	Male blue eyes and blonde	163 Hz	110 Hz	68 dB	35 dB
	Mean	146 Hz	94 Hz	62 dB	35 dB
Anger	Female dark eyes and hair	142 Hz	99 Hz	63 dB	27 dB
	Female blue eyes and blonde	169 Hz	125 Hz	66 dB	33 dB
	Male dark eyes and hair	160 Hz	82 Hz	66 dB	29 dB
	Male blue eyes and blonde	123 Hz	88 Hz	66 dB	51 dB
	Mean	148 Hz	98 Hz	65 dB	35 dB

With the actors' pictures and videos, we tested that the represented expressions were the same as a group of informants could recognize. A sample of 25 people assessed each picture and video with semantic scales in which they had to choose the specific expression that they perceived. In each evaluation, there was at least 90% agreed with the proposed expression. Therefore, we can conclude that the pictures and videos used for the experiment correctly showed the five expressions and that there were no significant differences among the actors/actresses performing the same expression.

2.3. Participants

Once the stimulus was created, a sample formed of 200 participants ($N = 200$, 119 were female and 81 males, aged between 19 and 43 years) answered to an online survey. The survey was randomly sent to participants using social media. All the participants signed the informed consent.

2.4. Dependent variables

2.4.1. Pleasantness

Pleasantness was composed of five items: pleasant, persuasive, attractive, natural, and friendly, and measured on a 5-point scale. A factor analysis was conducted for the initial scale items (attractive, clear, pleasant, persuasive, credibility, dynamic, natural). All the items were assessed on the appropriate factor (.6 or higher). The Kaiser-Meyer-Olkin value was .96, exceeding the recommended value of .6, and Bartlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. Factor analysis produced the factor pleasantness. Five items (pleasantness, persuasiveness, attractiveness, naturalness, and friendliness) had loadings on the first factor that exceeded .85. Thus, the first factor was labeled as the pleasantness scale and was formed by the level of the

> Before speech delivery, happiness and confidence were the expressions perceived as more pleasant, positive, and less negative

speaker's pleasantness, persuasiveness, attractiveness, naturalness, and friendliness, where the value 1 represented the lowest level and 5 the highest. The Cronbach Alpha coefficient for this scale was .94; thus, with a high coefficient in the reliability tests.

> Confidence was the most pleasant, positive, and less negative expression, followed by happiness, anger, shyness, and indifference during the speech

2.4.2. Valence

Valence referred to the positive or negative emotions elicited and was measured using the Self-Assessment Manikin (SAM). SAM is a picture-oriented questionnaire developed to measure an emotional response (**Bradley**; **Lang**, 1994). We adapted it to two 5-point scales, one for positive and the one for negative emotion, with value 1 representing a less positive/negative emotion and 5 the most positive/negative.

2.4.3. Credibility

Credibility refers to the characteristic of being trustworthy. In oral communication, achieving the audience's trust is critical to getting listeners to believe the speaker's words. We used the credibility scale by **McCroskey** and **Teven** (1999). This scale comprises three primary credibility dimensions: competence, trustworthiness, and goodwill. Competence refers to having experience, knowledge, and leadership abilities while trustworthiness means character, and goodwill refers to the intention toward the listener of the message. All three dimensions were measured on a five-point scale, with 1 representing the minimum value and 5 the maximum. The Cronbach Alpha coefficient was .91, with a high coefficient in the reliability tests.

2.4.4. Comprehension

This variable refers to understanding and being familiar with a situation, facts, etc. To test the audience's comprehension of the audience, this study introduced an explicit question about the speakers' comprehension when exposed to the stimuli, ranging from 1 to 5, with the value 1 representing poor comprehension and 5 total comprehension.

The dependent variables pleasantness and positive/negative valence were applied to the first experiment, the pictures before speech delivery. For the second experiment, the videos during speech delivery, we added credibility and comprehension, as these variables are difficult to evaluate in static pictures, especially comprehension without speaking.

3. Results

3.1. First part of the study

To test H1.1 and H2.1 and to answer Q2, a five (expression) by two (physical appearance) by two (gender: male vs. female) factorial MANOVA was performed on the two dependent variables: pleasantness and emotional valence.

About the pleasantness variable, the dependent variables resulted in significant main effects for expression, F (4, 106) = 757.74, p < .001, partial η^2 = .583. Happiness was the most pleasant expression, followed by confidence, shyness, indifference, and anger. Post-doc test showed significant differences among all the expressions except shyness and anger. There were also significant differences for gender F (1, 109) = 7.72, p = .005, partial η^2 = .004. The female speakers were rated as more pleasant than male speakers. Also, there were significant results in the interaction between gender and expression, F (4,106) = 31.21, p < .001, partial η^2 = .054. Women were perceived as more pleasant in all the expressions, except in confidence, in which men scored above women. Although the blue-eyed and blond-haired speakers were considered more pleasant, there were not significant effects on physical appearance, F (1,109) = 1.33, p = .248, partial η^2 = .001. However, there were significant effects for the interaction between physical appearance and expression, F (4,106) = 12.69, p < .001, partial η^2 = .023. In confidence, the blue-eyed and blond haired speakers were perceived as more pleasant than the dark-eyed and haired ones. The same occurred for anger by blue-eyed and blond-haired speakers compared to dark-eyed and hair ones.

Regarding the valence variable, there were significant main effects for expression, F (4,106) = 1308.17, p < .001, partial η^2 = .707. On the positive scale, happiness was the most positive expression, followed by confidence, indifference, shyness, and anger. Post-doc test showed significant differences among all the expressions, except between shyness and anger. There were significant differences for gender F (1, 109) = 19.08, p < .001, partial η^2 = .009. The female speakers were evaluated as more positive than male speakers. There were significant results in the interaction between gender and expression, F (4, 106) = 22.08, p < .001, partial η^2 = .039. Women were perceived as more positive in all the expressions, except in confidence, in which men scored higher than women. There were no significant effects for physical appearance, F (1, 109) = 1.24, p = .265, partial η^2 = .001, but there was an interaction appearance by expression, F (1, 109) = 34.80, p < .001, partial η^2 = .060. The blue-eyed and blond hair speakers were considered as more positive than the dark-eyed and hair ones about confidence and anger.

For the negative scale, there were also significant results for expression, F (4, 106) = 1094.41, p < .001, partial η^2 = .669. Anger was the most negative expression, followed by shyness, indifference, confidence, and happiness. Post-doc test showed significant differences among all the expressions. There were significant differences for gender F (1, 109) = 8.84, p = .003, partial η^2 = .004. The male speakers were evaluated as more negative than female speakers. There were significant results in the interaction between gender and expression, F (4, 106) = 14.72, p < .001, partial η^2 = .026. Men were perceived as more negative in all the expressions, except in confidence, in which women were above men. There were no significant effects for appearance, *F* (1, 109) = 3.12, *p* = .077, partial η^2 = .001, but there was an interaction between appearance by expression, *F* (1, 109) = 11.82, *p* < .001, partial η^2 = .021. The dark-eyed and dark-haired speakers were considered more negative than blue-eyed and blond-hair speakers in confidence. The results are shown in Table 2.

Table 2. Pleasantness and valence before delivering the speech (pictures)

Speakers' expressions	**Pleasantness**		**Positive valence**		**Negative valence**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***
Happiness	4.25	.86	4.48	.76	1.39	.66
Confidence	4.07	.70	4.10	.60	1.77	.65
Indifference	2.32	.92	2.33	.81	2.91	.65
Shyness	2.54	.93	1.92	.88	3.54	1.07
Anger	2.04	.91	1.81	.82	4.19	.77
Appearance	**Pleasantness**		**Positive valence**		**Negative valence**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***
Dark eyes and hair	2.95*	1.25	2.95*	1.27	2.79*	1.27
Blue eyes and blonde hair	2.99*	1.37	2.91*	1.47	2.73*	1.34
Gender	**Pleasantness**		**Positive valence**		**Negative valence**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***
Female speaker	3.02	1.22	3	1.29	2.71	1.24
Male speaker	2.92	1.40	2.86	1.45	2.80	1.37

*No significant results

These results confirm H1.1, but not H2.1. Before speech delivery, happiness and confidence were the expressions perceived as more pleasant, positive, and less negative. Contrary to our predictions, female speakers were considered more pleasant, positive, and less negative than male presenters in all expressions, except confidence. Male speakers were considered more pleasant, positive, and less negative in this expression. Regarding Q2, physical appearance did not attain significant results, but there was an interaction with some expressions. In pleasantness and positiveness, blue-eyed and blond-haired speakers were perceived as more confident than their dark-eyed and haired counterparts, who further on were perceived as the angriest. Dark-eyed and dark-haired were considered less confident.

3.2. Second part of the study

To test H2.1, H2.2, and answer Q2, a five (expressions) by two (physical appearance) by two (gender: male vs. female) factorial MANOVA was performed on the dependent variables: pleasantness, emotional valence, credibility, and comprehension.

Regarding the pleasantness scale, there were significant main effects for expression, *F* (4, 106) = 832.68, *p* < .001, partial η^2 = .604. Confidence was the most pleasant, followed by happiness, anger, shyness, and indifference. Post-doc test showed significant differences among all the expressions. There were significant differences for physical appearance, *F* (1, 109) = 21.35, *p* < .001, partial η^2 = .010. The dark-eyed and hair speakers were better evaluated than the blue-eyed and blond speakers. There were significant results for the interaction between expression and appearance, *F* (1, 109) = 40.76, *p* < .001, partial η^2 = .070. The dark-eyed were perceived as more pleasant in all the expressions, except in confidence. There were also differences for gender, *F* (1, 109) = 12.84, *p* = .004, partial η^2 = .006. The female speakers were considered more pleasant than the male speakers. Finally, there were differences in the interaction between expression and gender, *F* (4, 106) = 13.50, *p* < .001, partial η^2 = .024. The female speakers were more pleasant than the male ones in all the expressions, except in confidence.

In the positive valence scale, there were significant main effects for expression, *F* (4, 106) = 832.68, *p* < .001, partial η^2 = .604. Happiness was the most positive expression, followed by confidence, anger, shyness, and indifference. Post-doc test showed significant differences among all the expressions, except between shyness and anger. Also, there were significant differences for physical appearance, *F* (1, 109) = 8.58, *p* = .003, partial η^2 = .004. The dark-eyed and-haired speakers were better evaluated than the blue-eyed and blond-haired actors. There were significant results for the interaction between expression and appearance, *F* (1, 109) = 35.94, *p* < .001, partial η^2 = .062. The dark-eyed and-haired speakers were perceived as more positive in all the expressions, except in confidence. There were also differences for gender, *F* (1, 109) = 11.06, *p* = .001, partial η^2 = .005. The female speakers were considered as more positive than the male speakers. Lastly, there were differences in the interaction between expression and gender, *F* (4, 106) = 9.21, *p* < .001, partial η^2 = .017. The female speakers were more positive than the male ones in all the expressions, except indifference.

> Female speakers were evaluated as more positive than male speakers before and during the speech

> Women were perceived as more positive in all the expressions, except confidence, where men scored higher

In the negative valence scale, there were significant main effects for expression, F (4, 106) = 535.85, p < .001, partial η^2 = .496. Indifference was the most negative expression, followed by anger, shyness, confidence, and happiness. Post-doc test showed significant differences among all the expressions, except shyness and anger. There were significant differences for physical appearance, F (1, 109) = 10.48, p = .001, partial η^2 = .005. The dark-eyed and blond-haired speakers were evaluated as less negative than the blue-eyed and blond hair speakers. There were significant results for the interaction between expression and appearance, F (1, 109) = 26.08, p < .001, partial η^2 = .046. As in the other variables, the dark-eyed and dark-haired speakers were perceived as less negative in all the expressions, except in confidence. There were also differences for gender F (1, 109) = 10.48, p = .001, partial η^2 = .005. The female speakers were considered less negative than the male speakers. Also, there were differences in the interaction between expression and gender, F (4, 106) = 9.92, p < .001, partial η^2 = .018. The female speakers were less negative than the male ones in all the expressions, except for indifference.

Concerning the credibility scale, the dependent variables resulted in significant main effects for expression, F (4, 106) = 635.06, p < .001, partial η^2 = .538. Confidence was the most credible expression, followed by happiness, anger, shyness, and indifference. Post-doc test showed significant differences among all the expressions, except indifference and shyness. There were significant differences for physical appearance, F (1, 109) = 32.15, p < .001, partial η^2 = .015. The dark-eyed and dark-haired speakers were considered more credible than the blue-eyed and blond-haired speakers. There were significant results for the interaction between expression and appearance, F (1, 109) = 35.35, p < .001, partial η^2 = .061. As in the other cases, the dark-eyed and dark-haired speakers were perceived as more credible in all the expressions, except in confidence. While there were no differences for gender, F (1, 109) = 2.88, p = .090, partial η^2 = .001, the interaction between expression and gender did yield significant differences, F (4, 106) = 9.68, p < .001, partial η^2 = .017. The male speakers were more credible than the female ones in all the expressions, except for shyness.

In comprehension, the results were significant for expression, F (4, 106) = 430.31, p < .001, partial η^2 = .441. Confidence was the most comprehensible, followed by happiness, anger, shyness, and indifference. Post-doc test showed significant differences among all the expressions. There were significant differences for physical appearance, F (1, 109) = 22.40, p = .001, partial η^2 = .010. The dark-eyed and -haired speakers were considered as more understandable than the blue-eyed and and blond-haired speakers. There were significant results for the interaction between expression and appearance, F (1, 109) = 20.49, p < .001, partial η^2 = .036. In the same line, the dark-eyed and-haired speakers were perceived as more comprehensible in all the expressions, except in confidence. In this variable, there were not differences for gender, F (1, 109) = .727, p = .394, partial η^2 = .000, but there were for the interaction between expression and gender, F (4, 106) = 6.36, p < .001, partial η^2 = .012. The male speakers were more comprehensible than the female ones in all expressions, except happiness. Table 3 shows the results.

Table 3. Pleasantness, credibility, valence, and comprehension delivering the speech (videos)

Speakers' expressions	**Pleasantness**		**Positive valence**		**Negative valence**		**Credibility**		**Comprehension**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***
Confidence	3.88	.84	3.89	.97	1.59	.85	3.98	.90	4.19	.93
Happiness	3.64	.91	4.25	.91	1.80	.93	3.58	1.03	3.97	.97
Anger	2.38	.84	2.04	.96	3.44	1.06	2.63	1.02	3.08	1.19
Shyness	1.85	.75	1.89	.93	3.51	1.10	1.78	.83	2.24	1.07
Indifference	1.63	.61	1.45	.71	3.92	1.08	1.67	.74	2.00	1.00
Appearance	**Pleasantness**		**Positive valence**		**Negative valence**		**Credibility**		**Comprehension**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***
Dark eyes and hair	2.75	1.20	2.76	1.39	2.78	1.32	2.83	1.29	3.20	1.32
Blue eyes and blonde hair	2.60	1.23	2.65	1.51	2.92	1.46	2.62	1.30	3.00	1.39
Gender	**Pleasantness**		**Positive valence**		**Negative valence**		**Credibility**		**Comprehension**	
	Mean	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***	***Mean***	***SD***
Female speaker	2.73	1.21	2.76	1.44	2.78	1.39	2.76*	1.30	3.11*	1.37
Male speaker	2.62	1.22	2.64	1.45	2.92	1.39	2.70*	1.29	3.07*	1.35

*No significant results

These results confirm H2.1, but not H2.2. While delivering the discourse, confidence, followed by happiness, was perceived as more pleasant, positive, less negative, more credible, and comprehensible than anger, shyness, and indifference. Contrary to our predictions, female speakers were considered more pleasant, positive, and less negative than the male presenters, although there were no significant differences in credibility and comprehension. In the interaction between expression and gender, the female speakers were more pleasant than the male ones in all expressions except confidence. They also were perceived as more positive and less negative in all the expressions, except indifference.

However, the male speakers were more credible than the female ones in all expressions except shyness and happiness, and more comprehensible than the female speakers except happiness. Therefore, H2.2 cannot be confirmed. Regarding Q2, dark-eyed and dark-haired speakers were considered as more pleasant, positive, less negative, more credible, and more comprehensible than blue-eyed and blond-haired speakers. However, in the interaction between expressions and appearance, the blue-eyed and blond-haired speakers achieved a better evaluation in confidence.

> The study shows significant differences in credibility according to physical appearance, with dark-haired and dark-eyed speakers rated as more credible and understandable

To answer Q1, we compared the means in the common variables –pleasantness, positive or negative perception of the different expressions in the pictures and videos. For the pleasantness and positive valence, participants rated higher the pictures over the videos in all the expressions except anger. The result was the same for negative valence, but shyness and anger were perceived as less negative in the video. Therefore, the expressions were perceived as clearer and more intense in the pictures than in the videos. There were significant correlations among the variables: between pleasantness in picture and video, Pearson Correlation (χ^2 = .087, Sig. (2-tailed): .000); positive, Pearson Correlation (χ^2 = .211, Sig. (2-tailed): .000), and negative, Pearson Correlation (χ^2 = .231, Sig. (2-tailed): .000).

4. Discussion

This study aimed to analyze the audience's perception of speakers' expressions, gender, and physical appearance before and during a public presentation. This study examined the effects of five fundamental expressions of high relevance in public speaking –happiness, confidence, indifference, shyness, and anger– on audience perception of pleasantness, emotional valence, credibility, and comprehension. All five expressions were tested as performed by brown-haired/dark-eyed male and female speakers, and blond-haired/blue-eyed male and female speakers posing in pictures and videos. The findings contribute to understanding how these two moments of presentations –static (previous) or dynamic (during the speech)– impact the first impression-based interpretation of the speaker before the speech, or a more conscious comprehension-driven interpretation of the speaker during speech delivery

First, our results showed that the speakers' expressions significantly affected the perception of public speaking performance. Analyzed individually, the results demonstrated that happiness and confidence were perceived as more pleasant, positive, and less negative before speech delivery than shyness, indifference, and anger. In the case of videos, confidence was the most pleasant, positive, and less negative expression followed by happiness, anger, shyness, and indifference. These results align with previous literature in which participants rated happy faces as pleasant and angry faces as unpleasant in public speaking contexts, especially those participants that scored high in speech anxiety (**Dimberg**; **Thunberg**, 2007). On the contrary, shyness or anger are associated with unpleasantness, as both are considered to inhibit or hinder public speaking performance at nonverbal levels. Shyness can be associated with anxiety or fear, especially in those situations requiring a social performance such as public presentations (**Hancock** *et al.*, 2010). The differences between pictures and videos could be explained based on the influence of nonverbal cues such as voice, hand gestures, and body movement when delivering the speech. Nonverbal cues have been proven to enhance confidence and counter shyness and anger during speech delivery (**Hancock** *et al.*, 2010; **Pereira-dos-Santos** *et al.*, 2020). Moreover, as an indicator of confidence vocal pitch can influence expressions (**Guyer** *et al.*, 2021). According to this, one plausible explanation for confidence ranking higher in videos could stem from the modality influence. The dynamic speech, with different nonverbal cues especially voice, enhanced the confidence perception and countered shyness and anger, as shown in our results.

Consistent with this logic, the credibility scale and the comprehension results during speech delivery showed that confidence resulted in the best-rated expression, followed by happiness, anger, shyness, and indifference. These findings build on confidence being one of the essential expressions to raise credibility at the onset of public speaking, and are in line with other studies in which confidence and happiness raised credibility and pleasantness evaluation (**Glazer**, 2017; **Kröger** *et al.*, 2010; **MacIntyre**; **Thivierge**, 1995). Finally, according to the valence scale, results during the speech were consistent with the first part of the experiment showing happiness as the most positive expression, followed by confidence, anger, shyness, and indifference.

Secondly, findings on gender differences can be seen as a step forward in theory and practice. Contrary to our predictions, female speakers were evaluated as more positive than male speakers before and during speech delivery. Consistent with previous pleasantness' results, women were perceived as more positive in all the expressions, except in confidence, in which men rated higher. A plausible interpretation for women scoring lower on confidence could be based on the existing gender stereotypes or gender schemas (**Bailey** *et al.*, 2020). Gender schemas allow us to process gender-related information more rapidly and with less effort (**Chang**; **Hitchon**, 2004). Based on the traditional gender norms, men have been stereotypically associated with competence (**Brann**; **Himes**, 2010; **Carli**, 2001; **Nelson**; **Signorella**; **Botti**, 2016) and agency (**Conway**;

> Speakers' expressions were perceived as clearer and more intense in the images (before delivering the speech) than in the videos (during the delivery of the speech)

> Static information about the speaker can have a powerful impact on the audience's evaluations and first impressions

Vartanian, 2000; **Johnson** *et al.*, 2008), whereas women are linked to warmth (**Carli**, 2001) and communality (**Abele**; **Wojciszke**, 2014; **Conway**; **Vartanian**, 2000; **Johnson** *et al.*, 2008). Our results prove that women were evaluated more positively in all the expressions, except in confidence, where they scored lower. These results suggest that the speaker's assessment was evaluated on inferences based on gender, in line with previous studies that have proven the impact of gender stereotypes on speakers' perception and evaluation (**Klaas**; **Boukes**, 2020). Furthermore, the credibility scale showed no differences for gender in credibility and comprehension. These results are in line with previous research that had proved no such thing as male's voices scoring higher in effectiveness or credibility (**Rodero** *et al.*, 2013).

Concerning the implications of the speakers' appearance before and during speech delivery, results showed several differences in between modalities and in the interaction of expressions. Before the speech, there were no significant effects on physical appearance; but during the speech, dark-eyed and haired speakers were generally better evaluated than the blue-eyed and blond-haired speakers. In terms of pleasantness and the positive valence, before the speech the blue-eyed and blond-haired speakers were perceived as more pleasant than the dark-eyed and-haired speakers in confidence and anger. In contrast, during the speech, the brown-eyed and dark-haired speakers were considered as more pleasant in all the expressions, except in confidence (blue-eyed and blonde-haired speakers scored higher).

One plausible explanation for the physical appearance differences –blue-eyed and blonde-haired speakers scoring higher in pictures and brown-eyed and dark-haired scoring higher in the videos– could be due to the moderating effect of modality and its influence on perception and impression creation. As far as we know, the perception of the speakers' expression and the associated message in public speaking may be moderated by their physical appearance. Therefore, these results can be interpreted according to the logic of physical appearance's first impression, understood as a type of judgment made rapidly, non-consciously, spontaneously, with minimal information (**Ritchie** *et al.*, 2017; **Zebrowitz**, 2017). The static images of the speakers before the presentation could have enhanced the emotional processing, which is relatively superficial, activating stereotypes and prejudicial behaviors to create this first impression. This may also be an underlying mechanism to explain the association between facial attractiveness and leadership posed by the evolutionary leadership theory (**Van-Vugt**; **Grabo**, 2015).

Following the same rationale, the appearance stereotype that has traditionally associated beauty and other positive outcomes with blonde hair and blue eyes would thus be contested in the case of videos, since the audience would assess the speakers with added elements, specifically verbal and non-verbal dynamic cues. Having more structural elements would enhance the allocation of cognitive resources and would yield a more elaborated processing. Consistent with this theory, our study shows significant credibility differences by physical appearance being dark hair/eyes speakers more credible and more comprehensible.

Further on, from an intercultural standpoint a drawing on the positive discrimination theory, these results can also be interpreted as a "what looks like me is good" effect. The audience may show a positive physical appearance bias when the other, hence attributing more positive values to those speakers that seem closer to their cultural pattern. Our findings align with this approach as the study was conducted in a country that meets the cultural standard of the brown-eyed and dark-haired pattern.

Finally, the comparison of both modalities, before and during speech delivery, demonstrated that participants considered the pictures more pleasant and positive than the videos in all expressions except anger. Therefore, the speakers' expressions were perceived as more precise and intense in pictures (before the speech) than in videos (during the speech delivery). These results show, first, that the static information about the speaker can have a powerful impact on the audience evaluation and first impressions. Secondly, that static images of the speakers before the presentation could have reinforced the emotional processing, which is more superficial, based on simple rules, and usually results in a more powerful first impression. Third, these results showed how audience evaluation starts even before the speech delivery and becomes distinctive, in line with **Juslin** and **Laukka** (2003). They found that participants could categorize consistently (70% rate) five primary expressions in a public speaking onset (happiness, anger, sadness, tenderness, fear). In conclusion, this study shows that the physical behavior before delivering the speech, i.e., while waiting to be settled and ready, while being introduced, and particularly the few seconds before the verbal onset, can be relevant too.

Overall, this study proves that nonverbal behavior can be a fertile field of study before delivering the speech, as most research on public speaking expressions has usually focused on verbal traits and facial expressions during the delivery phase (**Brownlow**, 1992; **Rodero**, 2022; **Rodero** *et al.*, 2022). This experiment helps to understand the principles of oral expression and its effects on the audience's perception of leadership before and during a short speech, representing a more comprehensive approach to the public speaking field and theory. Findings can be easily applied to practice in politics or any sort of organizational setting through training exercises before and during speech delivery.

> Results showed that the audience evaluation starts before the speech delivery and becomes distinctive

5. Limitations

This study has some limitations. A significant one is the achievement of accurate interpretations of expressions by actors/actresses. Although they were trained and had models to rehearse with, one can assume inevitable variability among actors/actresses in the performance of expressions. In fact, results could be influenced by actors' and actresses' personal charisma, expressivity, and personality. Moreover, this study focuses on five primary expressions stemming from the existing literature on public speaking confidence and anxiety. Further research should extend the number of expressions or nonverbal behaviors before delivering the speech and contrast the effects found in this study. Finally, more studies are necessary to explore this and other non-verbal elements individually –gaze, posture, or specific gestures.

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Abstract

Radio art is understood as radio made by artists. The term is typically applied to sound-based artifacts produced and broadcast by means of the creative use of radio media affordances, infrastructure, and technologies. Radio art is known as any sound work conceived to expand the creative and aesthetic possibilities of the medium through the use of the elements of radiophonic language (voice, words, music, sound effects, and silence) with the intention to produce aesthetic messages and to move radio listeners. This study introduces radio art reception as a subject of scientific scrutiny. It proposes a model of radio art processing that includes involvement, art reception, and positive emotions as predictors of the willingness to listen to such works. After listening to each of two pieces of radio art, 126 Singaporean undergraduate communication students (M_{Age} = 22.7, SD = 1.7) completed a questionnaire measuring involvement, art reception, perceived emotions, and willingness to listen to another radio art feature. The main results confirm our model of radio art reception: involvement predicts the audience's cognitive stimulation generated by radio art, their artistic evaluation, and the positive attraction experienced by audiences towards them. The positive emotions experienced during consumption have a direct effect on the attraction towards radio art. Moreover, the specific radio art content affects the audiences' responses. These results allow us to understand psychological responses to sound art. The hope is to attract the attention of communication and art researchers and invite them to deepen the existing knowledge about artistic sound through empirical studies, since debates about radio art and sound works are almost lacking from scientific literature.

Keywords

Radio art; Sound art; Artistic sound; Art reception; Involvement; Emotions; Radiophonic language; Radio aesthetics; Creative radio; Creative sound; Emotions; Path analysis; Media psychology.

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1. Introduction

Radio art is generally understood as radio made by artists (**Iges**, 2004). Although when art is implied, definitions tend to become blurred (**Glandien**, 2000), the term is typically applied to sound-based artifacts produced and broadcast by means of the creative use of radio media affordances, infrastructure, and technologies (**Barber**, 2017a). Radio art is known as any sound work conceived to expand the creative and aesthetic possibilities of the medium through the use of the elements of radiophonic language (voice, words, music, sound effects, and silence) with the intention to produce aesthetic messages and to move radio listeners (**Camacho**, 2007). It is defined also as a melting pot of heterogeneous elements, a world of sounds and noises coming from the real acoustic environment or artificially produced that are organized in an acoustic symbiosis thanks to the electronic technology (**Schöning**, 1997). Radio art intends to challenge traditional radio creation, communication and consumption while transporting radio practices and listening beyond conventionalities to engage listeners to artistic practices (**Barber**, 2017b). It is constructed primarily for radio, as opposed to audio art or experimental music (**Zurbrugg**, 1989). Radio art can adopt different formats, such as sound text collages, soundscapes, electro-acoustic compositions, or noise art (**DeLys**; **Foley**, 2006). Actually, radio art resists clear classifications (**Black**, 2010).

Frequently, radio art creators work within interdisciplinary production teams which include complementary professional profiles such as sound engineers and radio producers. Indeed, radio artists could come from disciplines such as literature, music, theater, film sound, performance art, or documentary. They tend to believe that aesthetic experiences could be something else other than viewing artworks in museums or galleries (**Mullin** *et al.*, 2017). They think creatively from inside the media and use the elements of radiophonic media with an aesthetic intention (**De-Quevedo-Orozco**, 2001). Nowadays, radio art initiatives held persistently over time have been mainly produced by public broadcasters, community, university, or experimental radio stations (**Iges**, 2004).

1.1. Radio art, an old manifestation

The idea of using radio in an artistic way is as old as the radiophonic medium itself (**Glandien**, 2000). During the last century, radio art was part of the regular radio offering, and audio culture played a pivotal role in vanguard artistic practices (**Mende**, 2008). At the turn of the twenty-first century, the technological advances in recording and manipulating sound stimulated the emergence of radio art as a distinctive international art form (**Gómez**, 2008; **Mende**, 2008). Later, the new radio delivery mechanisms (e.g., internet, mobile phones) gave rise to new forms of radio art content and interactions with them (**DeLys**; **Foley**, 2006). Throughout the last two decades of the millennium, radio art rebounded through new concepts, claims and questions. New approaches to the traditional art genres of radio work (e.g., sound poetry, radio theater) and new artistic radiogenic forms emerged as a consequence of the work of visual artists interested in the possibilities of sound and multimedia (**Mende**, 2008). Such increasing interest in radio art was also reflected in the support to free radio stations, the edition of some key texts, or the organization of international conferences and exhibitions (**Mende**, 2008). Since then, the attention to radio art has continued to grow as shown in the more recent massive one-month *Radio Revolten International Radio Art Festival* celebrated in Germany (1st–30th October 2016) or the *Canadian 60 Second Radio contest* (May 14th, 2020) in which 297 works from 29 countries participated.

However, neither communication nor art studies have paid attention to the artistic possibilities of radio or to the idea that radio could be also an artistic phenomenon. Despite the fact that few forms of artistic inquiry can claim such a long and powerful history as radio art, it has received scarce attention from researchers (**Mende**, 2008). There are several possible reasons for this (**De-Quevedo-Orozco**, 2001):

- radio´s early adoption of a commercial model;
- the fact that radio is considered by many as a content transmitter instead of a content generator;
- the existence of a visual predominance in our society;
- the absence of an autonomous and independent music theory of artistic sound;
- the impact of technology itself;
- a general lack of knowledge of the possible artistic radiophonic forms.

Actually, radio evolved historically into a mass medium through a technology related to, and able to comment on, everyday reality (**Mende**, 2008), so its informative nature has been dominant over other uses (**Iges**, 2004).

1.2. Radio art, a challenge for perception

Art theorists and art critics state that radio art is a world of sound formed by the juxtaposition of noise, music and speech, which implies a distinctive listening mode (**Breitsameter**, 1998, cited by **Hall**, 2015). They consider that the density of the audio montages of these programs inevitably implies an experimental interaction between producers, sounds, and audiences (**Spinelly**, 2005). Moreover, that radio arts are aesthetic artifacts which deal with a process of transformation from sound to language, to mental images, presented as limited or altered acoustic forms, which automatically triggers attentiveness. Accordingly, this would require receivers to perceive radio art selectively and specifically without having a physical space as a frame of reference (**DeLys**; **Foley**, 2006).

Furthermore, theorists state that radio arts imply a potentially demanding listening experience (**Gómez**, 2008) since their perception requires converting sound sensations to mental images and meanings (**Iges**, 2004). The radio artists might for example propose a temporal and spatial dimension through a combination of movements and sound levels so that the combined audio perception would be accepted as an acoustic representation of a physical space. This would require a specific mode of listening which must, in a way, be trained, similar to how the enjoyment of narrative conventions of films required audiences to adjust their perceptions in the earlier days of cinema (**Iges**, 2009). Arguably, audiences today may have lost that listening mode because of the disappearance of these kinds of productions, artistic or otherwise, which were more typical from early and even modern-day 'cultural' radio (**Iges**, 2004). Medium theorists have written in this area, suggesting that shifting to one medium and away from another may bring about both gains and losses to audiences (**Postman**, 1993, and **McLuhan**, 1994, for example, have famously written on these topics). Despite of all the above, there are no known empirical studies dedicated to analyzing the reception of radio art despite its uniqueness. This research aims to fill in such gap. Indeed, it aims to understand psychological responses to sound art and further the current knowledge about the characteristics of radio art listening through an experimental experience. Particularly, this study proposes a model for understanding radio art reception. In doing so, it introduces radio art reception as a subject of scientific scrutiny (**Soto-Sanfiel**; **Freeman**; **Angulo-Brunet**, 2021) which will inform radio studies and empirical aesthetics, an area in need of attention (**Augustin**; **Wagemans**, 2012).

Radio art intends to challenge traditional radio creation, communication and consumption while transporting radio practices and listening beyond conventionalities to engage listeners into artistic practices

There are also some other reasons to observe the reception of radio art works. First, the consolidation of the audience's on-demand media practices, which implies not only the selection but the way of listening to content, would favor the reception of radio arts by interested audiences (**Iges**, 2009). Furthermore, sound art, in its many forms, has grown and proliferated worldwide due to the recent increase in online engagement caused by phenomena such as the Covid-19 pandemic. Audiences are turning to art and to radio art in particular (*Mase*, 2020). Finally, radio art is a constructive method for opening up the listening practices while moving ourselves beyond the constraints of the dominant modes of storytelling and the anthropocentric dialogues (**Donovan**, 2018).

1.3. Towards a model of radio art reception

Preliminary literature on media psychology has identified involvement, emotional experience, and characteristics of the content as prominent variables for explaining media consumption and aesthetical experience. A review of the evidence related to those variables that could be applied to radio art reception follows next.

Involvement

A radio art piece is an *acousmatic sound* work in the words of **Schaeffer** (1966). Receivers are unable to see the sources of its constituent sounds, which implies they must apply different listening strategies to clarify their perception. One key aspect is that, while listening to radio arts, receivers are especially sensitive to the acoustic invariants since they inform about the potential sources and their origins. Simultaneously, receivers perceive the technological treatment of the original source in confluence with the impact of the transmission equipment and the environment. The perception of acousmatic pieces radically differs from the perception of real events (**Windsor**, 2000). This process is meant to be as the disembodiment of the sound, which would imply that listeners become more involved mentally (**Kolb**, 1993).

Involvement is a relevant variable for processing audio messages (**Celsi**; **Olson**, 1988; **Gotlieb**; **Sarel**, 1991; **Petty**; **Cacioppo**, 1979; **Zaichkowsky**, 1985). Psychology defines it as an immediate and direct experience of the receivers (**Krugman**, 1966); as a motivational state that incites receivers to engage in message processing (**Petty**; **Cacioppo**, 1979). Involvement predicts attention (**Kruglanski** *et al.*, 2006) and induces a reward expectation (**Braverman**, 2005). Higher involvement produces greater personal relevance of the audio message (**Engel**; **Blackwell**, 1982; **Krugman**, 1965; **Lang** *et al.*, 2007; **Petty**; **Cacioppo**, 1979): a message's content receives greater attention and processing when the recipient is motivated and able to analyze its content (**Petty** *et al.*, 2004; **Todorov**; **Chaiken**; **Henderson**, 2002). Thus, involvement with radio arts would be an important aspect of its reception.

Radio art is a constructive method for opening up the listening practices while moving ourselves beyond the constraints of the dominant modes of storytelling and the anthropocentric dialogues

Emotional experience

As argued before radio arts are very complex audio messages. They typically contain a juxtaposition of multiple voice changes, sound effects, silences, and music onsets acoustically synthesized. They can also employ a great deal of cuts, edits, and information density.

Early research in perception informs us that stimulus complexity is one of the most important stimulus properties in message processing (**Güçlütürk** *et al.*, 2018). The auditory structural complexity of an audio message impacts its cognitive processing: greater auditory structural complexity produces greater cognitive capacity to process the message (**Potter**; **Choi**, 2006). On the contrary, too much complexity of audio messages produces cognitive overload (**Dillman-Carpentier**, 2010; **Potter**; **Callison**, 2000). An excess of structural features in the message affects attention, hinders processing, and affects recall (**Dillman-Carpentier**, 2010).

However, the complexity of a media message would also impact the emotional experience of its consumption. When individuals are faced with too many elements to cognitively process, their enjoyment is reduced. According to the Limited Capacity Model of Media Message Processing, receivers process effectively a small number of simultaneous elements (**Lang**, 2000; **Lang**; **Dhillon**; **Dong**, 1995). A message containing a moderated inclusion of elements increases not only the involvement but the emotional responses and its enjoyment (**Grabe** *et al.*, 2000; **Lang**, 2000; **Yoon** *et al.*, 1999). Indeed, the emotional tone of the message, its production pacing, and the number of elements that it includes affect its emotional processing (**Bolls**; **Lang**; **Potter**, 2001; **Bolls**; **Muehling**; **Yoon**, 2003). Consequently, the specific content of the radio art, which is typically a complex audio message, would impact the emotional experience of its consumption.

Aesthetic responses

Aesthetic responses are related to the complexity of the message too. According to the processing-fluency approach, the aesthetic judgments of audiences are closely related to the subjective ease with which mental operations are performed when perceiving a stimulus (**Reber**; **Schwarz**; **Winkielman**, 2004). Although there is no empirical evidence related to sound, visual studies state that in cases of relatively abstract art works, the ease of deriving meaning from stimuli is relevant (**Topolinski**; **Strack**, 2009), since they produce better aesthetic preference judgments (**Ball** *et al.*, 2018).

Moreover, the aesthetic liking of art work is related to the stimulus properties (e.g., **Bar**; **Neta**, 2006; **Bertamini**; **Makin**; **Rampone**, 2013; **Oppenheimer**; **Frank**, 2008; **Reber**; **Winkielman**; **Schwarz**, 1998; **Wurtz**; **Reber**; **Zimmerman**, 2008) and the perceivers' familiarity with it. A prior history of the receiver with the stimulus or repeated exposure to it, would increase processing fluency and, subsequently, its liking (e.g., **Bornstein**, 1989; **Bornstein**; **D'Agostino**, 1994). There is evidence that the complexity of the message interacts with an aesthetic appreciation in the perception of its beauty (**Ball** *et al.*, 2018).

All of the above leads us to propose the next model of radio art consumption formed by involvement and positive emotions as predictors of perception of the art on these manifestations. The perception of art would predict, in turn, the willingness to consume other radio arts (see Figure 1).

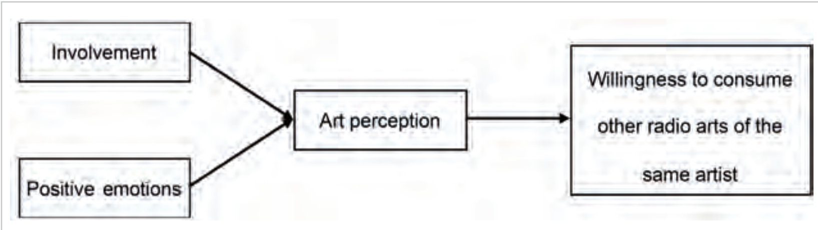

Figure 1. Theoretical model of radio art consumption.

Accordingly, we formulate the following two hypotheses:

H1: The effect of the different variables in the model will differ depending on the radio art stimulus.

H2: The audience's involvement with a radio art work and their positive emotional experience will impact the audience's perception of the artistic qualities and the audience's willingness to continue consuming other radio arts (see Figure 1).

2. Method

2.1. Participants

We used a convenience sample of 126 Singaporean undergraduate communication students (M_{Age} = 22.7, *SD* = 1.7) enrolled in a class on radio production. Of them, 63% were men. Moreover, 85% of the participants declared to have a Chinese background, while 9% were Malay and 2% Indian. Further, 4% declared 'other ethnical background' or preferred not to disclose. Finally, 14% (*n* = 18) reported prior knowledge of radio arts (familiarity).

Students participated on a voluntary basis without any compensation. The data collection occurred after their class. They were asked to collaborate with the study then. It was clarified by the researchers that consent was obtained from their willingness to stay on the experience.

2.2. Materials

Stimulus

We used two radio art works produced by students of an advanced radio production class directed and taught by one of the researchers of this study. Both art pieces had a similar length. They were comprised of elements of sound language (e.g., sound effects, music, silence, and some single words), which were synthesized and manipulated in their acoustical parameters, speed and rhythm for example. Radio art 1 (05:04) was inspired by the four seasons. It was modeled on the rotation of earth compared to life cycles (from birth to death) and reflected on eternity. Radio art 2 was inspired by the travels of Carl Linnaeus, considered the father of modern taxonomy and ecology. It was modeled on different habitats on earth and climate change (04:54). A qualitative pre-test carried out during the summer of 2018 indicated that radio art 2 was considered to be more abstract than radio art 1. Participants were able to apprehend the purpose, narrative, and content to a greater extent in radio art 1 than in radio art 2. Radio art 1 was also considered to be easier to be understood.

Measures

Participants completed a paper questionnaire with various sections:

Sociodemographic variables. Sex (Male or Female); Age; Ethnic background (Chinese, Indian, Malay, and Others) which was recoded into two categories (Chinese and Others), and previous knowledge of radio art (Yes/No).

Involvement. We created a 4–item scale (e.g., "Keep your interest [poorly-well]) following the works of **Rodero** (2012), and **Suckfull** and **Scharkow** (2009). We obtained adequate goodness of fit indexes (GOFI) and internal consistency reliability for radio art 1 (confirmatory factor analysis [CFA]: χ^2[df] = 1.63 [2], CFI =1.00, TLI = 1.00, RMSEA =.00 [.00–.16]; ω = .86, α = .86) and also for radio art 2(χ^2[df] = 4.24 [2], CFI = .99, TLI = .97, RMSEA =.09 [.00–.22]; ω = .86, α = .85).

Emotions. We used the modified Differential Emotions Scale (mDES, **Fredrickson** *et al.,* 2003), which contains 20 items (e.g., "I felt amused or fun-loving"; 1 = Totally disagree / 5 = Totally agree). We obtained evidence of validity and reliability for a positive emotions factor in radio art 1 (CFA: χ^2[df] = 6.23 (20), CFI = 1.00, TLI = 1.00, RMSEA = .0 (.00–.00); ω = .92, α = .92) and in radio art 2 (χ^2[df] = 11.46 [20], CFI = 1.00, TLI = 1.00, RMSEA = .00 (.00–.00); ω = .92, α = .90). We also obtained evidence of validity and reliability for a negative emotions factor in radio art 1 (χ^2[df] = 10.052 [27], CFI = 1.00, TLI = 1.00, RMSEA = .0 (.00–.00); ω = .92, α = .92) and radio art 2(χ^2[df] = 67.99 [27], CFI = .97, TLI = .96, RMSEA = .11 (.08–.14); ω = .82, α = .85).

Art reception. We adapted the *Art Reception Survey* (*ARS*; **Hager** *et al*., 2012) for being suitable to radio arts. As in the original scale, our adaptation has 29 items grouped in six dimensions (1 = Totally disagree / 5 = Totally agree):

- Cognitive stimulation (CS; 5 items; e.g., "This radio art made me curios");
- Negative emotionality (NE; 5 items; e.g., "This radio art makes me experiment negative physical sensations");
- Expertise (EX; 5 items; e.g., "I can relate this radio art to a specific art historical context");
- Self-reference (SR; 4 items; e.g., "The radio art makes me think about my own life");
- Artistic quality (AQ; 5 items; e.g., "This radio art features a high level of creativity"); and
- Positive attraction (PA; 5 items; e.g., "This radio art is pleasant").

We obtained validity evidence of internal structure for the radio art reception scale through a CFA for a 6–factor correlated model in the radio art 1 (χ^2[df] = 330.30 [242], CFI = .98, TLI = .98, RMSEA = .05 [.04–.07]) and also in radio art 2 (χ^2[df] = 260.60 [242], CFI = 1.00, TLI = 1.00, RMSEA =.02 [.00–.05]). Internal consistency reliability coefficients were adequate for all dimensions in both phases except for expertise: CS (radio art 1: ω = .92, α = .92 ; radio art 2: ω = .92, α = .91); NE (radio art 1: ω = .93 α = .93; radio art 2: ω = .90, α = .93); EX (radio art 1: ω = .60, α = .4; radio art 2: ω = .65, α = .4); SR (radio art 1: ω = .83, α = .91; radio art 2: ω = .89, α = .86); AQ (radio art 1: ω = .73, α = .91; radio art 2: ω = .92, α = .95); PA (radio art 1: ω = .88, α = .86; radio art 2: ω = .90, α = .89). The adapted questionnaire for *Radio Art Reception Survey* is included at the appendix 1. We believe researchers can apply it to different sub-genres of sonorous art by modifying accordingly the name of the specific sub-genre.

Willingness to listen to another radio art. We used a single- item on a 5-point Likert scale ("I would like to listen to other radio arts of the same artist"; 1 = Totally disagree / 5 = Totally agree).

2.3. Procedure

The study followed the guides of the hosting university for empirical studies including human participants. Ethical consent was obtained from the respective committee before beginning the data collection. It was carried out during the course of the academic year 2018-2019, right after the ending of a regular class at the *Wee Kim Wee School of Communication* (*Nanyang Technological University*, Singapore). Students were asked to collaborate with the research freely and voluntarily. No compensation was provided to them. Participants accepted by remaining in the room after the class. Only the researchers were present during the entire activity.

Participants were randomly assigned into two equal groups.. All participants listened to the radio arts in the same room, as it was acoustically adequate for sound perception. Participants were informed that they were going to listen to two radio art works based on science and that they would be asked to fill out a paper questionnaire with scales, right after listening to each one of them. They were also informed that they could retire from the study at any time without required explanation. The first group listened to radio art 1 first whereas the other group listened to radio art 2 first. The radio art 1 audio was introduced as a piece about the earth's rotation. The radio art 2 audio was introduced as a piece art about climate diversity and change. Two researchers were in the room during the test for assistance.

2.4. Data analysis

All the analyses were performed with *R* software (*R Core Team*, 2019). In order to examine quantitative psychometric properties of the questionnaires (see Measures section), we followed **Viladrich**, **Angulo-Brunet** and **Doval** (2017) recommendations. We examined internal structure through CFA with *lavaan* package (**Rosseel**, 2012) using unweighted least squares estimator (ULS), considering the sample size (see Participants section). In order to assess GOFI, we considered excellent fit (**Hu**; **Bentler**, 1999) values greater than .95 in the *comparative fit index* (CFI) and *Tucker-Lewis index* (TLI), and smaller than .05 in *Root mean square error of approximation* (RMSEA). We considered acceptable fit (**Marsh**; **Hau**;

Wen, 2004) CFI and TLI greater than .90 and RMSEA smaller than .08. According to **Viladrich**, **Angulo-Brunet** and **Doval** (2017), we obtained two internal consistency coefficients: omega (ω; **Green**; **Yang**, 2009) and Cronbach's alpha (α; for comparison purposes with previous research).

We also performed a paired Welch t-test (**Delacre**; **Lakens**; **Leys**, 2017) for comparing scores between the two radio arts with *t.test* function and obtained Cohen's d effect size with *cohen.d* from package *effsize* (**Torchiano**, 2019). We considered an effect greater than 0.8 as large, an effect between 0.8 and 0.5 as medium, and an effect greater than 0.2 small following **Cohen**'s suggestions (1988). Furthermore, we performed two separate path analyses using the *sem* function from the *lavaan* package.

3. Results

In general, radio art 1 was better appreciated than radio art 2. As Figure 2 shows, participants stated they had greater involvement in radio art 1. They also reported experiencing greater positive emotions and less negative emotions than in radio art 2. Consequently, the audience's involvement and emotional experience depended on the specific radio art they consumed, which is in line with H1.

Regarding art reception, participants manifested that they had experienced greater cognitive stimulation in radio art 1 than for radio art 2 with the effect being small. Moreover, similar to negative emotions, participants experienced greater negative emotionality for radio art 2 than in radio art 1. As for expertise, we did not find evidence of reliability for the mean score and there was no further testing with those variables. Concerning self-reference, we did not obtain differences between the two radio art works. In terms of artistic quality, participants perceived slightly more quality in radio art 1 than in radio art 2. They also felt more positively attracted to radio art 1 than to radio art 2. Finally, concerning the willingness to listen to other radio arts from the same artists, participants manifested they would like to listen to them more in the vein of radio art 1 than in radio art 2. Consequently, the specific radio art impacts the negative emotionality, the perceived artistic quality, the positive attraction towards the specific art work, and the willingness to listen to more radio art works, which confirms H1.

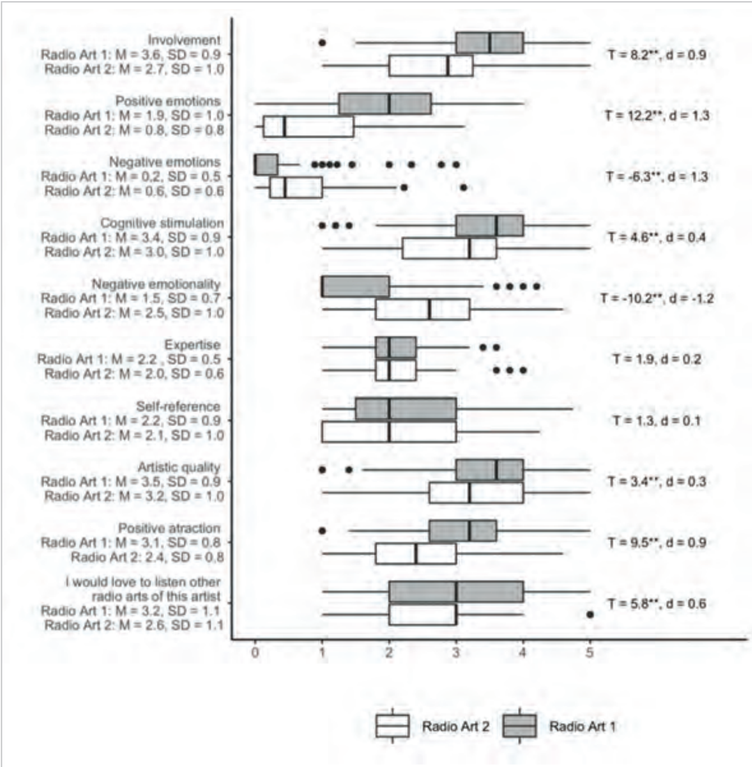

Figure 2. Boxplot and mean comparison.

We later tested the theoretical model presented in the introduction. First, we examined the model for radio art 1. Standardized regression coefficients for path analysis are shown in Figure 3. GOFI were adequate (χ^2[df] = 2.45 [2], p = .29, CFI =.99, TLI = .99, RMSEA =.04 [.00–.19]).

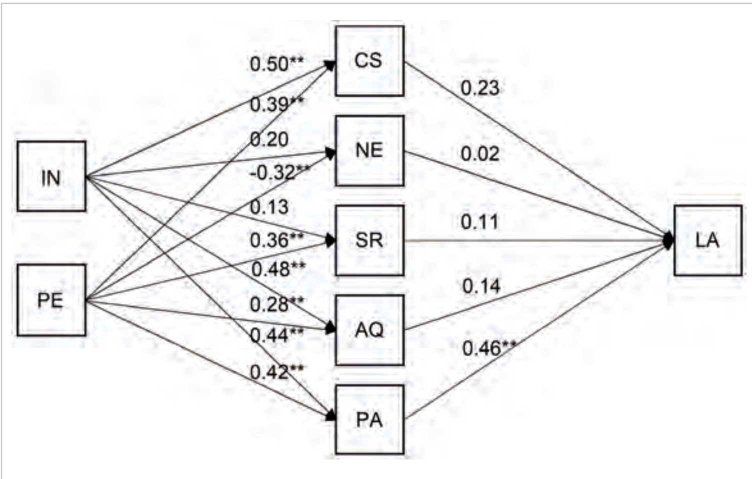

Figure 3. Path analysis for radio art 1.
Note. * p =.05, ** p <.001. PE = Positive emotions, IN = Involvement; CS =Cognitive stimulation; NE =Negative emotionality; SR = Self-reference; AQ = Artistic quality; PA = Positive attraction; LA = Willingness to listen to another radio art.

Results show a direct effect of involvement on cognitive stimulation (β = 0.50, p <.001), artistic quality (β = 0.48, p <.001) and positive attraction (β = 0.44, p <.001). We also found a direct effect of positive emotions on cognitive stimulation (β = 0.39, p <.001), negative emotionality (β = –0.32, p =.005), self-reference (β = 0.36, p <.001), artistic quality (β = 0.28, p =.001) and positive attraction (β = 0.42, p <.05). At the same time, we observed a direct effect from positive attraction to willingness to listen to another radio art work (β = 0.46, p <.001). Indeed, this model explains a 67% of willingness to listen to another radio art variance, which is in line with H2. The model also explains a 63% of cognitive stimulation variance, a 7% of negative emotionality variance, a 20% of self-reference variance, a 47% of artistic quality variance, and 57% of a positive attraction variance.

We also verified the proposed model for radio art 2. Figure 4 shows the results of path analysis for radio art 2. GOFI were adequate (χ^2[df] = 2.51 [2], *p* = .28, CFI =.99, TLI = .98, RMSEA =.05 [.00–.19]).

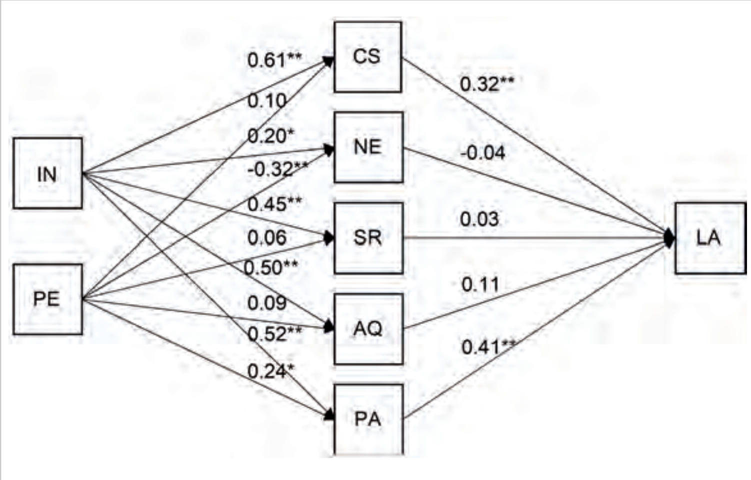

Figure 4. Path analysis for radio art 2.
Note. *p =.05, ** p <.001. PE = Positive emotions; IN = Involvement; CS = Cognitive stimulation; NE = Negative emotionally; SR = Self-reference; AQ = Artistic quality; PA = Positive attraction; LA = Willingness to listen to another radio art.

Results indicate that involvement has a direct effect on cognitive stimulation (β = 0.61, *p* <.001), negative emotionality (β = 0.20, *p* <.05), self-reference (β = 0.45, *p* <.001), artistic quality (β = 0.50, *p* <.001) and positive attraction (β = 0.52, *p* <.001). In turn, positive emotions also have a negative direct effect on negative emotionality (β = –0.34, *p* <.001) and a positive effect on positive attraction (β = 0.24, *p* <.05). There is also an effect of cognitive stimulation on willingness to listen to other radio art (β = 0.32, *p* <.001) and of positive attraction on willingness to listen to another radio art (β = 0.41, *p* <.001). All things considered, 64% of the variance for the 'willingness to listen to another art' is explained by this model. As in the model for radio art 1, this is in line with H1. Regarding other dependent variables, the r-squared informed that the model explains 45% of the cognitive stimulation variance, 44% of a positive attraction variance, 30% of an artistic quality variance, 24% of the self-regulation variance, and 9% of the negative stimulation variance.

4. Discussion

This study introduces radio arts, and sound art in general, as a topic of scientific inquiry (**Soto-Sanfiel**; **Freeman**; **Angulo-Brunet**, 2021). It hopes to attract the attention of communication and art researchers and invite them to deepen the existing knowledge about this artistic manifestation through empirical studies. Fundamentally, this study portends to open the debate about radio arts and sound works, which is fairly non-existent in the scientific literature. In doing so, this study vindicates the scientific research of the expressive qualities of sound and artistic radio, which could enlarge our understanding of the spectrum of media listening practices, uses and consumptions, together with broadening our perspectives about storytelling (**Donovan**, 2018) and benefiting a more rigorously elaborated cultural radio (**Iges**, 2004).

Particularly, this research has studied radio art in the light of meaningful psychological variables related by the previous literature written on media consumption and aesthetical experience. Consequently, this study advances the understanding of the processes that explain the reception of sound art and, particularly, of radio arts.

The main results of this study inform that involvement is an important aspect of the perception of radio arts. Involvement predicts the audience's cognitive stimulation generated by radio arts, their artistic evaluation, and the favourable attraction experienced by audiences towards them. All of this is coherent with the preliminary pieces of evidence which confirm the relevance of involvement in the processing of audio messages in general (**Celsi**; **Olson**, 1988; **Gotlieb**; **Sarel**, 1991; **Petty**; **Cacioppo**, 1979; **Zaichkowsky**, 1985).

Through the two radio art pieces we have confirmed a model in which involvement and positive emotions affect the perception of art values within artistic sound pieces, and that this perception in turn affects the willingness to consume other radio arts of the same artist (first hypothesis). However, although we have also confirmed the same model for the different art pieces, we have also observed that the effects of the variables are different for each one. Regarding the second hypothesis, our main results show that the positive emotions experienced during the consumption of radio arts have a positive direct effect on the attraction to such works. Positive emotions also show a negative direct effect on the negative emotions experienced. These results ecologically provide support for the validity of our measures. However, what is more relevant is that they offer valuable information for promoting the listening and appreciation of radio arts. According to our results, developing a positive attraction to radio arts requires provoking positive emotions while avoiding negative emotions for potential audiences. Moreover, a positive attraction towards a radio art work directly impacts the willingness to listen to another radio art work for both of the stimuli used in this study. Perhaps the entertaining function of media, related basically with positive hedonic emotions,

> This study advances the understanding of the processes that explain the reception of sound art and, particularly, of radio

such as enjoyment (**Vorderer**; **Klimmt**; **Ritterfeld**, 2004), has interacted with the evaluation of the emotional experience related to the radio arts by the participants of this study. This is important since many radio arts tend to do exactly the opposite: they intend to provoke anxiety, fear or uncertainty in their listeners. They attempt to emphasize dark, enigmatic, dramatic or stressing sensations more related to negative emotions. On the other hand, the socio-demographic characteristics of the sample could also have exerted an influence on the equation. In any case, future studies with samples of different cultural backgrounds could provide more information on the relationship between the emotional experience and the attraction in radio art evaluation and consumption.

> We have confirmed a model in which involvement and positive emotions affect the perception of art values within artistic sound pieces, and that this perception in turn affects the willingness to consume other radio arts

Despite that, it must also be remembered that preliminary literature has warned us that enjoyment of media messages is affected by the complexity and abundance of elements to be processed simultaneously (**Lang**, 2000; **Lang**; **Dhillon**; **Dong**, 1995). It is possible that the radio arts used as stimulus in this study were moderately abstract and complex so to elicit positive emotions and positive attraction in the examined sample. According to previous evidence, both qualities tend to produce positive emotional responses and involvement (**Grabe** *et al.*, 2000; **Lang**, 2000; **Lang** *et al.*, 1999; **Yoon**; **Bolls**; **Muehling**, 1999). It is thus necessary, that further studies experimentally manipulate the content constituents of the radio arts audio to deepen the understanding of these observations. Such works could provide clues about the limits of content complexity for producing positive aesthetical responses to artistic sound works. The theory of limited capacity model of media messages (**Lang**, 2000; **Lang**; **Dhillon**; **Dong**, 1995) would be a convenient framework to observe the extent to which even more abstract radio arts, about different topics, and through manipulating different acoustical structural elements, affect the emotional experience and the positive attraction to radio arts by different audiences.

One of the main contributions of this study is that it has obtained evidence for the proposed model of radio art consumption. According to the confirmed model, and across all the radio arts of this study, involvement and positive emotions during radio art listening directly impacts the cognitive processing and the perception of the artistic characteristics of such works which, consequently, impacts the willingness to consume other radio arts.

However, our results have also informed that the degree of involvement, the emotional experience, the perception of artistic qualities of the specific artistic piece and the willingness to listen to another radio arts are affected by the specific content of the listened-to radio art work. This result is not surprising, given that the characteristics associated with the stimulus play an important role in the artistic experience. Nevertheless, they inform radio art creators who wish to appeal to wider audiences that they should consider the relationship between the characteristics of their target receivers and the sound piece as well. This is meaningful for radio artists because they frequently explore dark, enigmatic, intriguing or even anguishing topics/sensations in their works. Although there is still much research to be done on the perception of radio arts to provide more concrete guidelines for artists, this research suggests that contents eliciting positive emotions would promote a further willingness to listen to other pieces created by the artists.

On the other hand, it must be considered that this research did not manipulate specific characteristics of the content as variables; it only used two different works as a stimulus for confronting the direction of the content effect. Still, the better-appreciated radio art was precisely the one considered less abstract and easier to understand in the pre-test. Further studies must confirm and deepen our understanding of this assumption.

Moreover, due to the lack of questionnaires measuring the perception of the artistic qualities of radio arts, this research has also adapted and obtained validity evidence of internal structure and evidence of internal consistency reliability for both radio art works (see Measures section) in the *Art Reception Survey* (**Hager** *et al.*, 2012) initially produced for visual works. Considering the good evidence obtained, future works are encouraged to use this tool as an art reception measuring instrument.

Finally, it is worth considering that radio art is a macro genre label. It refers to different types of pieces (sub-genres) which use complex sound for inducing receivers' aesthetical experiences and moving audiences. This research used as stimulus two radio art pieces that were halfway between soundscapes and sound poetry. Although classifications of radio arts could be problematic, it is possible that the nature of the specific art work impacts on the described psychological processes. Because of that, further studies must specifically observe responses not only to different art works with varied content complexity and constituents but associated with different sub-genres. Other studies must also continue observing the mental images they generate and advance the research initiated by the recent experimental work of **Soto-Sanfiel**, **Freeman** and **Angulo-Brunet** (2021), the production of meaning by radio arts, and specific perception processes in the reception of these audio contents, which are important variables in their aesthetical reception as theory states.

One limitation of this research is that both radio arts were listened to by the participants in an artificial experimental situation, which was independent of a real radio listening experience. Some radio artists defend the idea that radio art perception must be related to a programming or transmission radio strategy. However, we think that considering the lack of research on radio arts, it is important to control the situation to have greater validity. Despite the fact that new on-demand practices imply different modes of reception and amplify the uses and consumptions of media, other researchers could examine radio art perception in the context of an institutional radio framework.

Another limitation of this work is that it used a convenience sample formed by Singaporean college communication students. It is plausible to consider that the socio-demographic characteristics and the cultural background of the participants could interact with the observations. Because of that, future studies should observe the radio arts' involvement, emotional experience, artistic evaluation, and attraction by many different audiences to observe the degree of generality of the information provided by our study and the extent to which the reception context influences the responses to radio arts. Since radio art is a genre mostly present within western contexts, it would be necessary to conduct cross-cultural comparisons particularly within western and non-western countries.

> This research has also adapted and obtained validity evidence of internal structure and evidence of internal consistency reliability for the *Art Reception Survey* (**Hager** *et al.*, 2012) initially produced for visual works. Considering the good evidence obtained, future works are encouraged to use this tool as an artistic sound reception measuring instrument

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6. Annex

Radio art reception survey (*RARS*)

Adapted from **Hager** *et al.* (2012). "Assessing aesthetic appreciation of visual artworks - The construction of the *Art Reception Survey* (*ARS*)". *Psychology of aesthetics, creativity, and the arts*, v. 6, n. 4, pp. 320-333.
https://doi.org/10.1037/a0028776

	1	2	3	4	5
	Completely disagree				**Completely agree**
This radio art made me curios					
This radio art is thought-provoking					
It is exciting to think about this radio art					
It is fun to deal with this radio art					
I would like to learn more about the background of this radio art					
This radio art makes me feel negative emotions					
This radio art makes me experiment negative physical sensations					
This radio art makes me feel sad					
This radio art makes me feel troubled					
This radio art disgusts me					
I can relate this radio art to a specific art historical context					
I can relate this radio art to a particular director					
I know this radio art					
I have an idea what the director is trying to convey with this radio art					
I have an idea what the director is trying to convey with this radio art					
The meaning of this radio art remains inaccessible to me					
The radio art makes me thing about my own life history					
I can associate this radio art with my own personal biography					
Personal memories of mine are linked to this radio art					
The radio art mirrors personal emotional states that I feel or have felt in my life					
This radio art is unique					
This radio art features a high level of creativity					
The composition of this radio art is of high quality					
The artist manner of creating it is fascinating					
The radio art is or was very innovative					
The radio art is pleasant					
The radio art is beautiful					
I would consider investing in buying the radio art					
The radio art thrills me					
I feel inspired by this radio art					
I would love to see other radio arts of this artists					

Technology gap and other tensions in social support and legal procedures: stakeholders' perceptions of online violence against women during the Covid-19 pandemic

Inês Amaral; Rita Basílio-Simões; Gabriela Poleac

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Abstract

As the Covid-19 pandemic intensified the digitisation of everyday lives and violent behaviours on many mainstream platforms, online violence against women raised renewed concerns. Across the literature, there has been an emphasis on survivors' experiences and actions to cope with technology-facilitated abuse. Still, little is known about how people perceive the nature, the prevalence, and the impacts of harmful online behaviours and the appropriate social and institutional responses to tackle them. This article aims to help fill this gap. It presents a qualitative study on stakeholders' perceptions conducted under the frame of a broader project which addresses the prevalence, nature and impact of online violence against women during the Covid-19 pandemic. Empirically, it draws on semi-structured interviews with Portuguese activists, police and law enforcement agents and different public and private service sector providers to explore perspectives on preventing, policing and coping with online violence. The findings expose several socio-technical challenges that prevent effective protection measures for victims and punitive consequences for perpetrators. They also suggest tensions in negotiating digital technology's role in social support and legal procedures.

Keywords

Online violence; Women; Pandemics; Covid-19; Digital abuse; Harassment; Harmful practices; Digital participation; Hate speech; Institutional responses; Legal procedures; Social networks; Social media; Internet.

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1. Introduction

Digital technologies offered unprecedented opportunities for coping with women's subordination, given their potential to be intrinsically democratic (**Papacharissi**, 2004) and participatory (**Dahlgren**, 2009). Across digital platforms, individuals and organisations address experiences related to sexism, misogyny, and violence, fight against gender injustice and different axes of social differentiation with which gender intersects, and put forward new ways of political engagement (**Keller**; **Mendes**; **Ringrose**, 2016; **Núñez-Puente**; **D'Antonio-Maceiras**; **Fernández-Romero**, 2019). However, digital technologies also raised new challenges to women's safety and feminist issues campaigns' by favouring the contexts for online gender-based violence and by helping create an unsafe environment (**Citron**, 2014; **Megarry**, 2014; **Brandt**; **Kizer**, 2015; **Henry**; **Powell**, 2015; **Ging**; **Siapera**, 2018; **Ging**; **Siapera**, 2019).

Evidence of ordinary women routinely experiencing online violence has raised new concerns about women's participation in the digital environment and the public sphere more broadly. Research suggests that women are more likely than men to experience online sexual harassment and stalking and to suffer devastating consequences following such abuse (*FRA*, 2014; **Dugan**, 2014; *EIGE*, 2017). Young women, in particular, disproportionately experience severe types of online harassment, including of sexual nature. These offences span the dark corners of the Internet and the most popular social media (**Muttaqin**; **Ambarwati**, 2020). Evidence also shows that misogynistic rhetoric and threats of sexual violence frequently occur as counter-back women engaged with feminist issues and struggles (**Banet-Weiser**, 2015; **Ben-David**; **Matamoros-Fernández**, 2016). Women with public visibility are preferential targets of abusive and misogynistic online attitudes and behaviours (**Lewis**; **Rowe**; **Wiper**, 2017). The mutual interplay between misogyny and anti-feminism is often the structural basis for online gendered abuse (**Ging**; **Siapera**, 2019). Hence, alongside helping to overcome systemic gender discrimination, the digital environment also supports gender-specific forms of status subordination. As pointed out by Wajcman,

> "while new information and communication technologies (ICTs) can be constitutive of new gender dynamics, they can also be derivative of and reflect older patterns of gender inequality." (**Wajcman**, 2006, p. 8)

As society was forced by the Covid-19 pandemic to reshape daily activities to overcome the confinements, already vulnerable communities were likely to be the least prepared to deal with hyper-connectedness (**Nguyen**; **Hargittai**; **Marler**, 2021). Digital inequalities have also shaped online sociability. The dynamics of power and resistance regarding ever-increasing online abuse practices have thus attracted increased attention. While general violence such as cyberbullying gained great scholarship prominence (**Chevis**; **Payne**, 2021), online abuse against women occupied important institutional agendas, from the *European Commission* to the *United Nations*.

Pre-Covid scholarship has extensively focused on users' experiences and actions to cope with online violence against women. Yet, with some exceptions (e.g. **Henry**; **Flynn**; **Powell**, 2018; **Free** *et al*., 2017), little attention has been paid to how key stakeholders conceive harmful online gendered behaviours. Little is known about their perception of the most appropriate measures to protect victims, help survivors, and prosecute perpetrators. Moreover, while the growing spread of digital technologies intensified the challenges concerning violence towards women across nations, local specificities, such as national legislation and regulation patterns, must be considered.

This article presents results from a qualitative study examining Portuguese stakeholders' perceptions of online violence against women. It is part of a broader project which addresses online violence against women during the Covid-19 pandemic in Portugal. By recognising the role of digital platforms as facilitators of misogynistic discourse and violent behaviours, this project uses a new feminist materialist approach combined with feminist phenomenology to analyse qualitative data. Notably, it addresses the problem of online violence as a range of experiences of victimisation that reify women's subordination and prevent women from full participation. Like other research (**Amaral**; **Simões**, 2021; **Simões**, 2021; **Simões**; **Amaral**; **Santos**, 2021), it situates online abuse towards women on the *continuum* of violence against women (**Kelly**, 1987), which ranges from intimidating behaviour to life-threatening situations, from psychological to physical and sexual violence.

Empirically, this study draws on semi-structured interviews with activists, police and law enforcement agents and different private and public sector providers. We examine the nature of online violence against women, its impacts during the Covid-19 pandemic perceived by

> Digital technologies offered unprecedented opportunities for coping with women's subordination, given their potential to be intrinsically democratic

stakeholders, and the social and institutional responses identified as proper to prevent and combat it. By analysing how key informants make sense of online violence against women and of coping with it, it further explores the challenges of designing institutional responses to capture the harms of technology-facilitated violence and provide gender awareness solutions.

> Digital technologies also raised new challenges to women's safety and feminist issues campaigns' by favouring the contexts for online gender-based violence and by helping create an unsafe environment

2. Digital participation

As digital technologies have infiltrated every part of our life (**Castells**, 1996), the need for relevant research on digital participation is mandatory. The idea of digital participation is linked to active participation in the digital society using modern information and communication technology (ICT) such as the Internet. Non-participation in the digital world can lead to social exclusion, and having access to the Internet and the motivation and abilities to use it can lead to a sense of social inclusion (**Seifert**; **Rössel**, 2019). Participation stems from civic agency, which involves the civic engagement of citizens in issues of public and political life (**Dahlgren**; **Álvares**, 2013). **Dahlgren** (2009) emphasises that the media directly impacts participation in public life in his model of civic cultures. The author considers that the idea of civic culture anchors in civic identity. Nevertheless, participation is more than media access or interaction (**Carpentier**, 2011; **Dahlgren**; **Álvares**, 2013).

Carpentier's definition of participation refers to minimalist and maximalist political-democratic models. The author argues that

> "while macro-participation relates to participation in the entire polis, country or political imagined community, micro-participation refers to the spheres of school, family, workplace, church and community" (**Carpentier**, 2011, p. 17).

Accordingly,

> "participation is not the same as access or interaction" (**Carpentier**, 2011, p. 27).

Furthermore, **Carpentier** (2011) contends that although access and interaction are part of the participatory process, participation implies the public takes action. In this sense, the participation dimension is more profound, implying direct consequences and not a mere engagement. In this sense, harmful participation forms can cause greater suffering than mere interaction, although both can be damaging.

Despite the Internet's remarkable characteristics in promoting free expression and bringing significant changes in political, social, economic, and cultural development, it also has a high potential for abuse, as with any powerful innovation (**Dickerson**, 2009). People increasingly use technology to engage with their peers, friends, love partners, and family members. As mediated interactions become more embedded into daily life, the potential to injure or emotionally harm someone rises. The new digital media practices create multiple forms of abuse and offences. At the same time, the increase in new media opportunities has enabled extremist groups and individuals to amplify their discriminatory messages, allowing them to shield themselves in anonymity (**Jakubowicz** *et al.*, 2017).

In addition, online engagement is a direct consequence of different communication patterns that influence individuals to have specific behaviours concerning participation (**Barnidge** *et al.*, 2014). The Internet may seem private, but everything that is shared can quickly become public. As a result, numerous types of abuse have emerged in the last decades, from cyberbullying to identity theft, from cyberharassment or cyberstalking to online rape and murder threats. As with other technology-facilitated harmful practices, these instances are seen as extensions of offline behaviours in that they often replicate the heavily gendered system of face-to-face interactions (**Ging**; **Siapera**, 2018). In particular, they encompass a wide range of forms of abuse, including verbal insults, sexist hate speech, sexual harassment, stalking, threats, intimidation, and invasion of privacy not typically aimed at women because of their actions but because of their mere existence as a group member and what this group is perceived to symbolise (**Ging**; **Siapera**, 2019). These harms have many forms. They often coincide with bullying directed at specific targets. Still, they equally often correspond to acts of gender discrimination and anti-feminism.

> Women with public visibility are preferential targets of abusive and misogynistic online attitudes and behaviours

3. The Covid-19 pandemic and online vulnerabilities

During the Covid-19 pandemic, when most of the world was isolated at home, people appealed to social media platforms like *Facebook*, *Instagram*, and *WhatsApp* to stay in touch. The Internet has become a lifeline, connecting one to individuals who are dear to them or just to outsiders. Advanced technology proved to be superior to all other forms of media. Users felt a sense of immediacy when communicating online. People noticed various apps that helped alleviate the lack of face-to-face meetings to some extent: corporate executives, relatives, partners, and friends met together in *Zoom*, *Skype*, *WhatsApp*, *FaceTime*, and other similar apps.

The lockdowns altered the external world in every meaningful way, including social interactions, online school and college lectures, and working from home. Most people's online activity increased dramatically as a result of this move. Since social media has become a primary form of contact during the pandemic-induced lockdowns, people have been actively sharing new accomplishments and expressing their thoughts more openly than before (**Jain** *et al.*, 2020). The increased social media exposure combined with demographic factors significantly impacted the mental health of these respondents, who experienced depression and anxiety due to the uncertainty surrounding the pandemic's impacts (**Gao** *et al.*, 2020). Thus, even though people have been isolated throughout the pandemic, they have become more vulnerable to online abuse (**Robinson** *et al.*, 2020).

> This study addresses the problem of online violence as a range of experiences of victimisation that reify women's subordination and prevent women from full participation in society

Evidence suggests that online forms of bullying differ from pre- to mid-Covid-19 times (**Barlett** *et al.*, 2021). At least two reasons explain these disparities.

- The first is related to the risen levels of stress and anxiety (**Boals**; **Banks**, 2020).
- Secondly, more access indicates a more severe danger.

Individuals spend more time online than average, and past research has shown that Internet use is associated with the emergence of cyberbullying (**Kowalski** *et al.*, 2014). When people consume more content on the Network and conduct most of their social and professional interactions through digital media, they are more exposed to hateful comments and harassment. This increases the risk of online victimisation and concerns about harmful online behaviours' nature, prevalence, and impacts. In Portugal, the *Safe Internet Line* of the *Portuguese Association of Victim Support* received 1626 requests for assistance and complaints on different types of cyber harm in 2021 and 1164 in 2020, mostly from women (*APAV*, 2020, 2021). In 2019, reports totalised 827, mostly from men (*APAV*, 2019). While these numbers reflect only the reported cases, not the ones that actually occurred, they mirror pre and post Covid-19 pandemic changes. Based on this, we sought to understand:

> RQ1: How do different stakeholders perceive online violence's nature, prevalence, and impacts during the Covid-19 pandemic?

4. Online violence against women

Despite the lack of data, the *European Commission* estimates that one in ten women have experienced online violence since age 15 (*EIGE*, 2017). The American *Pew Research Center* shows that the percentage of women reporting being sexually harassed online has risen since 2017 (**Vogels**, 2021). For the *United Nations* (*UNO*, 2021), the pandemic has been a catalyst for "a parallel global epidemic of violence against women around the world", with a significant increase in domestic violence, trafficking, sexual exploitation, and technology-facilitated abuse.

The proliferation of the Internet has long ago exacerbated the long-standing issues that women face, particularly those in conditions of increased vulnerability for not conforming to hegemonic identity patterns. Technology-facilitated harmful behaviours targeting women coexist with traditional, face-to-face violence. Both share the socio-cultural milieus in which cross-cutting gender subordination is historically rooted (**Shaw**; 2014; **Lewis**; **Rowe**; **Wiper**, 2017). Women may face a *continuum* of online aggressions, ranging from verbal offences and unwanted sexual advances to sexist and/or racist insults and frequent, harmful, frightening, and sometimes life-threatening abuse, as happens with offline violence. As pointed out earlier, the concept of the *continuum of violence*, from **Kelly** (1987), enables perceiving how both types of violence are not the result of isolated incidents but instead reflect patterns of asymmetrical power relations. Indeed, the ideologies that sustain the dominant power and unequal gender relations and the systemic discrimination that occurs in the digital environment must be seen in an interrelated way with the offline realm (**Amaral**; **Simões**, 2021).

Also, online and face-to-face violence seem to share numerous characteristics. **Lewis**, **Rowe** and **Wiper** (2017) found that most women have been subjected to various types of online abuse, with over half reporting that it is a regular feature of their online lives. The harmful behaviours are multiple and varied, just as in the real world. Their study also shows that the regularity with which abuse occurs is a hallmark of its impact. Rather than lessening its repercussions, frequency exacerbates it. As with real life violence, online abuse against women instils fear and silence, mainly through the threat of sexualised violence and exclusion, disdain, or discrediting. As others point out (**Sobieraj**, 2017; **Ging**; **Siapera**, 2018; **Ging**; **Siapera**, 2019), by favouring the scrutiny and policing of women's behaviour, the harmful online practices have chilling, silencing and self-censorship effects on female public participation, limiting personal and professional opportunities, just like can happen in result of traditional forms of violence. In addition, as offline violence against women, online abuse cases can significantly influence mental health. A study from **Finkelhor** (2020) shows that 32% of victims report stress symptoms, and 38% experience emotional discomfort. Also, they limit women's

> Participation dimension is more profound, implying direct consequences and not a mere engagement. In this sense, harmful participation forms can cause greater suffering than mere interaction, although both can be damaging

online expression and public involvement by causing emotional pain and the fear of offline stigmatisation.

> As mediated interactions become more embedded into daily life, the potential to injure or emotionally harm someone rises. The new digital media practices create multiple forms of abuse and offences

What distinguishes online violence from traditional harmful behaviours against women is that victims are more likely to be subjected to hostile events in multiple and new settings with infinite public visibility. The affordances of digital platforms, including –but not limited to– the visibility and spreadability of content, the anonymity/pseudonymity of users, and the multimodality of settings, enable an environment that differs from the offline and pre-social media era (**Bangasser-Evans** *et al.*, 2017; **Schrock**, 2015). The abusive practices can be transmitted in a variety of formats, including text, images, and GIFs (**Keum**; **Miller**, 2018) and linger on different platforms over time, amplifying the harm of victimisation. As **Williams** (2007, p. 103) suggests,

> "the permanency and visibility of violent narratives online give a certain longevity to the abusive text".

Indeed, abuse traces persist in cyberspace, intensifying the suffering of the victims (**Henry**; **Powell**, 2015).

Technology has allowed new forms of female victimisation and the emergence of networks based on a collective subculture of male dominance that aims to attack and silence women who dare to express their opinions about gender issues and masculine privilege by instigating abusive online practices (**Simões**; **Amaral**; **Santos**, 2021). Ultimately, permanence, itinerancy, and anonymity are among the most difficult challenges to manage (**Gagliardone** *et al.*, 2015, p. 13), and they all apply to both types of harmful behaviours.

As disseminating abusive content on the Internet becomes a significant cause of worry, the conflict between freedom of expression and hate control resurfaces. Societies still strive to protect freedom of expression and vulnerable groups from discrimination and abuse. Because both are recognised as fundamental human rights, governments face a challenging task in balancing the freedom to free expression with the protection from the consequences of hate (**Foxman**; **Wolf**, 2013). While hateful online practices don't deserve free speech protection (**Citron**; 2014; **Citron**; **Norton**, 2011), monitoring women's behaviour is a reminder of whoever is in charge and who sets the parameters within which women are free to move (**Megarry**, 2014), whereas men's freedom is unconstrained. Our interest is also in building on this research. Therefore:

> RQ2: What social and institutional responses are identified as proper to prevent and combat online violence against women?

5. Method

The methodological strategy we adopted starts from a feminist phenomenological perspective that considers womanhood and its historical, social structure (**De-Beauvoir**, 1949/2010; **Stein**, 1932/1996; **Arendt**, 1958/1973), her place of speech (**Spivak**, 2003), including the idea that the personal is political (**Hanisch**, 1969). This standpoint was co-opted by **Fraser** (2012), **Butler** (1988), and **Young** (2005) in multiple dimensions that state that gender does not focus exclusively on biology. We articulate this feminist phenomenological approach with a new feminist materialist perspective that argues that the dynamics of people's engagement with other people and objects are profoundly productive. Therefore, when people use digital technologies, they are not just consuming dominant ideologies but are also sensing, feeling, and embodying effective assemblages of matter, thought and language (**Barad**, 2007; **Bennett**, 2004; **Braidotti**, 2002; **Haraway**, 1988; 1991; **Lupton**, 2019). Interlinking these perspectives as a starting point for analysing perceptions of online violence against women allows, we believe, for a broader holistic understanding of the phenomenon.

From October 2020 to March 2021, we conducted 16 semi-structured interviews with Portuguese activists (8), law enforcement agents (4), and different private and public service sector providers, such as trade unions and victim support centres (5). The interviews ranged from 20 to 1h30 minutes, during which a series of open-ended questions were posed, asking about their perceptions and experiences with online violence generally and specifically regarding online violence against women and how they conceive the proper forms for dealing with it. Interviews were recorded and analysed for recurring ideas using qualitative methods. Following institutional ethic standards, participants' names are not used. Our analytical framework was critical thematic analysis. Following the proposal of **Lawless** and **Chen** (2019), the analytical process unfolded into two phases. Firstly, an open text coding was performed with the support of the *Maxqda* software to "identify, analyse and report patterns" in the data (**Braun**; **Clarke**, 2006, p. 79); secondly, the patterns recognised were interconnected with the broader ideological context. We thus search for both manifest meaning and more profound, critical interpretations.

> As with real life violence, online abuse against women instils fear and silence, mainly through the threat of sexualised violence and exclusion, disdain, or discrediting

6. Results and discussion

We identified four interconnected themes, as shown in Figure 1.

(1)The context and nature of online violence,
(2) its social consequences,
(3) the role of digital technologies during the pandemic, and
(4) the appropriate ways to prevent and combat online violence.

Themes 1, 2 and 3 helped us to answer RQ1 and theme 4, the RQ2, as we will show in what follows.

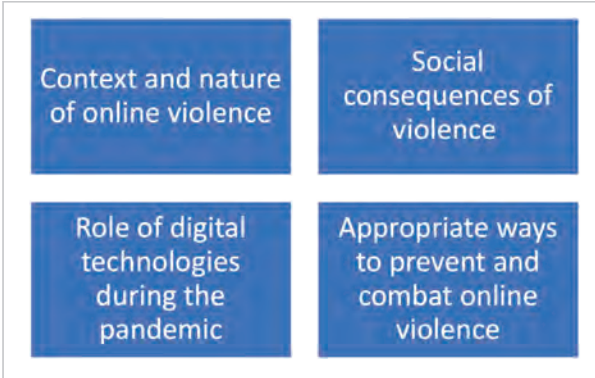

Figure 1. Interconnected themes in online violence

6.1. Context and nature of online violence

The first theme that surfaced in our data was the *Context and nature of online violence*. It groups intensively discussed issues and ideas on the modalities of violence, its difference from offline counterparts, and statements about the victims and the perpetrators. For the most part, stakeholders stressed the new modalities of aggressive behaviour digital technologies have favoured and the new challenges and risks they pose. Violence may occur in the shadows, but it also occurs on popular social media platforms such as *Instagram* and *Facebook* and instant messaging services such as *WhatsApp* and *Telegram*. Technology afforded new types of harmful practices and sometimes allowed to increase the intensity and severity of the existing ones. For instance, concerning stalking, as explained by an office manager from a victim support NGO:

> "The fact that the person is permanently in contact with the cell phone started to generate another type of violence and control (…), and even more aggravated forms of stalking through the use of the cell phone that did not exist before."

The interviewees reported the prevalence of a diverse range of new technology-facilitated harmful behaviours, often linked and profoundly dynamic, echoing the literature on the subject (**Citron**, 2014). From general and workplace harassment to sexist hate speech, from identity theft to doxing, from abuse through intimate images to cyber flashing, sextortion, image manipulation, and deep fake, for key Portuguese informants, online violence comes in many forms and affects women disproportionally. Some thus acknowledged the need to expand the defining field of violence against women.

Part of the interviewees recognises that the victims still normalise the violent acts they suffer. However, some contend that online practices are already considered more impactful than physical forms of aggression.

> "This psychological pressure, the control, the insults, the humiliation…, many of the women already identify this as violence that leaves more marks on them than sometimes this physical violence, which is watertight over time." (Office manager of a victim support NGO)

Overall, stakeholders believe that the victimisation profile is non-existence, except for being women or perceived as such. Online violence is transversal, most of them contended, reaching women of all ages and professions, just as happens with offline violence.

> "Women are heavily bombed with violent messages",

as stated by a psychologist of a social intervention team at an NGO. The interviewees are also more likely to contend that victims who experience these situations conditioned their responses/reactions due to fear. The immediacy of the digital and the ease of propagating violence on a continuum is said to encourage the perpetrator's behaviour but not the victim to snarl back. A few insisted that even disappearing online, women are never safe:

> "They all know that if they block all communication possibilities, violence will move from the online or remote context to the face-to-face context. (...) The big difference [in relation to offline violence] is that there is never, ever rest." (Volunteer at a Feminist NGO)

> The *European Commission* estimates that one in ten women have experienced online violence since age 15

Despite the absence of official data, there is a trend to recognise the inexistence of a single type of perpetrator. Stranger males with a visible or an anonymous profile, acting individually or in organised groups, are the authors of direct and indirect violence targeting women, as are well-known men such as acquaintances and intimate partners. Some also stress the role of women and female profiles integrated into collectives and organised groups, whose action is recognised as being expanded by the sensation of anonymity and impunity offered by the Internet. Others, mostly law enforcement agents, highlighted that, despite the diversity, perpetrators are typically men and usually intimate partners or former teammates. As an advisor of the *Attorney General's Office* commented, even if the perpetrators are anonymous,

> "in the end it becomes clear that they are acquaintances of the victim."

6.2. Social consequences of violence

> Governments face a challenging task in balancing the freedom to free expression with the protection from the consequences of hate

Focused on how online violence impacts victims, local communities and society more generally, *Social consequences of violence* are also a recurring theme across the conversations. Most stakeholders speak of the online impacts, which include self-censorship, self-discipline and silencing and even the victim abandonment, albeit temporary, of social media where the experiences of violence took place. These impacts result in an enormous self-limitation of the victims in the same environment where the violence occurred. Blocking profiles or abandoning a digital platform is, in the end, ways of normalising harmful behaviours that can change lives. As a police inspector from the *Unit for Combating Cybercrime and Technological Crime* pointed out, giving the example of abuse through intimate images:

> "It always works like this. Some collectors have nothing else to do if they don't collect this. And that when they see that content has been removed, they will circulate it on a private Telegram group, on a Brazilian website, on an American website, on a German website, wherever it may be. These are the most common places, and we have to tell them: 'Prepare yourself because this could resurface'".

The impacts of violence in the real life were also highlighted and described as immensely severe. They include stress and anxiety, isolation, feelings of insecurity, loss of self-esteem, and self-mutilation. The victim's entire web of social relationships is affected. Thus, some stressed that these have individual and collective impacts with which governments, social institutions and private agents should deal.

> "Some situations are leading to the voluntary dismissal of a woman who is being targeted by bullying online", stated a union leader.

Ultimately, as said by activists:

> "There will start to be a large group of people with poor mental health." (Person in charge of a victim support centre)
>
> "It has an impact primarily on the mental health and emotional and psychological well-being of the community." (Executive director of NGO for LGBT rights)

Some respondents also highlighted the impact of online violence targeting women on a deeper ideological level. Mostly, they believe we should expect negative consequences for the progress achieved regarding gender relations. Normalised online violence against women "increase the prejudice towards women", as contended by feminist activists. Also, in situations where there is already physical or psychological violence perpetrated by an intimate partner,

> "the online is another channel to introduce a new dimension of violence that will have a more generalised effect because it ends up affecting the victim in the community",

emphasised a member of a professional organisation.

6.3. Role of digital technologies during the pandemic

The third theme identified was the *Role of digital technologies during the pandemic*, which deals with observations about the use of digital technologies in the context of the pandemic and how they relate to motivated individuals using them for abuse and oppression. Overall, participants agreed that the pandemic has accelerated the phenomenon of digitisation of society by giving way to hyperconnectivity and accentuating online communication relationships. In general, they identify the benefits of digital technologies in light of the isolation created by the Covid-19 pandemic, namely in communicating with family and friends and in other daily life activities such as distance learning and labour work. Stakeholders are also unanimous when referring to the role of technology in shaping perpetration and victimisation patterns. As claimed by a person in charge of a victim support centre, "technologies interfere in our way of thinking".

> The immediacy of the digital and the ease of propagating violence on a continuum is said to encourage the perpetrator's behaviour but not the victim to snarl back

When most of the world was isolated at home, technology was an ally in the fight against loneliness and, at the same time, helped feed feelings of rage, ressentiment or simple boredom.

Some contend that there were undoubtedly cases of perpetrators being prompted to harmful practices, unaware that abuse can be profoundly terrifying with long-term consequences. Sometimes,

> "people don't have the exact idea of the gravity of what they are doing. But they are doing it",

said an inspector of the *Police Unit for Combating Cybercrime and Technological Crime*. Additionally, as a few stressed, the increase in digitisation, like the pandemic itself, took people and institutions by surprise. As technology incorporates social and political relationships, often increasing the burden on vulnerable groups (**Wajcman**, 2006), systemic inequalities were replicated "even if unintentionally", explained another agent of the Portuguese justice system.

Activists prefered differently to emphasise that, despite its essential role in connecting people and facilitating positive and negative actions, technology is far from the root cause of the problem.

> Perpetrators are typically men and usually intimate partners or former teammates

> "Technology is just the means of communication. The problem of violence is with the immaturity of violent people who cannot deal with anger and other primary emotions, such as shame",

argued a psychologist for a Social Intervention Team at an NGO. The attitudes, beliefs and values that sustain unbalanced power relations are endorsed by

> "a culture in which women's role as caregiver and women sexual objectification, for example, is tolerated and supported in real life and online",

claimed an activist of a feminist NGO. By overwhelming women at home, the pandemic may be contributing to this, she added.

Thus, for most people, online violence modalities are dynamic and accompany the transformations of the digital environment, integrating the continuum of violence against women that is inseparable from the offline context. Violence occurs indiscriminately on digital platforms and is often normalised and even minimised, despite causing fear, anxiety, and stress and affecting the victims' personal, social and professional spheres. Additionally, the pandemic is recognised as responsible for increased online violence by facilitating digitation and new social and political relationships, which can reify social subordination.

6.4. Appropriate ways to prevent and combat online violence

The theme *Appropriate ways to prevent and combat online violence* describes how participants make sense of coping with online violence against women. Overall, people realise the existence of various technological and social constraints that prevent effective protection measures for survivors and punitive consequences for perpetrators.

Most stakeholders mention a "technology gap" in social support and legal procedures. Those who provide support are always one step behind, claimed most participants. As the head of a public body mentioned:

> "The feeling I have as a user and observer is that this is very unmanageable".

Stakeholders agreed that efforts were made nationwide to go with technological changes. Still, the lack of knowledge to address the ever-evolving technology-facilitated harmful practices persists:

> "Most social institutions and even some that work specifically to protect victims of violence, are not minimally prepared to deal with technology." (Office manager at a feminist NGO)
>
> "In fact, there is still great unpreparedness among professionals in these matters." (President of NGO for supporting young people)

Participants stressed how it is challenging to regulate in this area due to the ever-evolving nature of technology affordances. However, most stakeholders stated that updating the legal framework according to the new types of harmful practices and the visibility they have is urgent. This means creating specific legal types with more targeted action warrants. Furthermore, while technology affords fast approaches, the justice system works slowly. That is why, most of the time,

> "the victim ends up not feeling secure in turning to legal institutions to seek help",

argued an advisor to NGO for victim support.

Reporting does not mean the perpetrators will be punished, as some participants realised. They are often not identified, and the victims can be at higher risk following the report, especially if the perpetrator is not a stranger. Nevertheless, reporting the cases by victims is mainly referred to as the response that victims can give to online abuse.

> "If it happens, get help as soon as possible to try to minimise the damage",

said an activist from a victim support NGO.

> "The first thing is to report",

claimed a volunteer at a feminist NGO.

> "We always encourage victims to report, but we also explain that it's a tough process that often goes nowhere, especially hate speech online",

said an activist from an NGO for LGBT Rights.

The reported cases are still not very expressive (*APAV*, 2019; 2020; 2021). The lack of awareness of online rights greatly influences victims' reactions:

> "People don't know whom to turn to, what to do, or what rights they have. Therefore, this area also needs major investment at various levels." (President of NGO for supporting young people)

The interviewees primarily argued that prevention measures are more challenging but promise to be effective. They involve education and information focusing on digital literacy to guarantee people's rights in digital environments.

Knowing the advantages, disadvantages and dangers of the platforms we use is the best way to prevent online violence, some participants highlighted. A few also mentioned the need to raise awareness of gender inequalities and that online actions might reinforce stereotypes. As an activist claimed:

> "Various technological and social constraints prevent effective protection measures for victims and punitive consequences for perpetrators"

> "Really teach younger people. They must be taught to be careful with privacy issues and to understand the impact that some of our actions online have, whether in terms of violence or bullying." (Office manager of a victim support NGO)

Stakeholders also suggested the existence of tensions in negotiating digital technology's role in social support and legal procedures. While technology can be an ally, for instance, by affording the creation of sites where victims and bystanders can report harmful behaviours to authorities, it seems that this is not yet a regular practice. As a union leader contended, even platforms created by the Public Administration for public workers' complaints did not work "more than once in a while".

Some agreed that technology can also help combat online violence through mechanisms to detect and report abuse. A few referred to the willingness of most platforms to collaborate in this. At the same time, they adverted that their efforts are insufficient. Algorithms have limitations because they are blind to gender issues, and there are no consequences for abusers. As an interviewee said:

> "Perhaps at the level of *Facebook*, if a person is constantly the target of complaints, maybe he has to be banned from that social media [platform], because he does not have appropriate behaviours for this experience." (Member of *Women Lawyers' Organization*)

Thus, some stakeholders claimed that platforms must be accountable. As an *Attorney General of the Republic* contended,

> "the platforms themselves can do control, but there is no way to impose control on the platforms".

Overall, the proper ways to prevent and combat online violence require changes in many dimensions. Participants signalled that institutions need specialised knowledge in the new dynamics of technology-facilitated violence targeting women and the urgency to change the law and legal procedures to accompany these dynamics. Some also spoke about the role of digital literacy and gender awareness in preventing harmful practices. Others spoke of the unexploited potential of technology to combat the harm practised through it, including regarding status subordination.

7. Conclusion

This paper examined Portuguese stakeholders' perceptions of the nature, the prevalence, and the impacts of harmful online behaviours targeting women and the appropriate social and institutional responses to tackle them. A qualitative approach helped to understand the production of meaning on this issue among important key informants. As described above, the Covid-19 pandemic is seen as responsible for the increase in the intensity of online violence and for reproducing social and political relationships that can lead to status subordination. Also, while institutions struggled to catch up with technology-facilitated abuse, users normalised the harmful behaviours and the ideological context to which the harmful behaviour is connected. At the same time, despite its potential to facilitate and stop abuse, technology has been largely unexplored in this domain. Promoting digital literacy, changing the law and other regulatory frameworks, and taking advantage of technological possibilities are all considered proper ways to cope with the issue. However, designing institutional responses that capture the harms of technology-facilitated gender-based violence is still challenging for stakeholders. These perceptions thus yield that greater attention must be paid by public bodies, digital platforms and other private players to gender awareness and to the use of technology as an instrument of systemic change.

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El videojuego como herramienta de alfabetización informacional en estudiantes universitarios

The video game as an information literacy tool for university students

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Resumen

Los videojuegos han resultado útiles para el aprendizaje en diferentes campos. El presente trabajo trata de evaluar la utilidad del videojuego como herramienta de aprendizaje para la alfabetización informacional de estudiantes de grado universitario. El videojuego "El último examen" nace tras el análisis de 1.639 consultas registradas en un período de dos años en la *Biblioteca de la Universidad Complutense*, y tiene como objetivo dar respuestas a demandas, que son extrapolables a otras bibliotecas universitarias. Para evaluar su utilidad se realiza un experimento piloto de grupo único con 14 estudiantes de grado. Los resultados muestran mejoras significativas en sus competencias informacionales y valoraciones positivas de la intervención. Se concluye que la incorporación de videojuegos como complemento a los contenidos de los programas formativos de las bibliotecas puede resultar provechoso, especialmente como introducción, refuerzo o evaluación de estos.

Palabras clave

Alfabetización informacional; Aprendizaje basado en juego; Estudiantes; Bibliotecas universitarias; Bibliotecas; Bibliotecarios; Competencias informacionales; Educación superior; Videojuegos.

Abstract

Video games are useful learning tools in different fields. This work seeks to evaluate, through a self-developed video game, their usefulness as a learning tool for the information literacy of undergraduate students. The videogame "The last exam" was developed after the analysis of 1,639 user queries registered over 2 years at the *Complutense University Library*, and aims to answer queries common to other university libraries. To evaluate its impact, a single-group pilot experiment was carried out with 14 undergraduate students using a pre-test/post-test validated by experts. The results show significant improvements in the students' information skills, as well as positive evaluations of the exercise. We conclude that the incorporation of video games as a complement to the content of library training programs can be beneficial, especially as an introduction or for reinforcement or evaluation.

Keywords

Libraries; Librarians; Academic libraries; Game-Based Learning; Higher education; Students; Information literacy; Information skills; Video games.

1. Introducción

El juego tiene una indudable aplicación en el campo del aprendizaje en cuanto que transmite emociones, despierta la curiosidad, fomenta la autonomía, el pensamiento crítico, la experimentación y la toma de decisiones (**Ordás**, 2018a). Prueba de ello son las múltiples aplicaciones que se han desarrollado en el campo educativo en cualquiera de sus etapas y campos de conocimiento, no solo como herramienta didáctica sino también motivacional (**García-Casaus** *et al.*, 2021).

El papel predominante de las bibliotecas en la enseñanza y aprendizaje de las competencias informacionales (**Gómez-Hernández**, 2010) ha llevado también a sus profesionales a poner en práctica experiencias de ludificación (o gamificación) y de aprendizaje basado en juego (**Ordás**, 2018b; **Campal**; **Ordás**, 2021), hasta el punto de dedicar un mes internacional al juego por parte de una de sus principales asociaciones profesionales (*ALA*, 2022).

A la hora de hablar de juego es importante diferenciar entre los conceptos de gamificación o ludificación, entendida como el uso de elementos y técnicas de juego en contenidos ajenos al juego, "hacer que las actividades sean más parecidas a un juego" (**Werbach**, 2014), y de aprendizaje basado en juego, donde el propio juego es el vehículo principal como herramienta de aprendizaje (**Cornellà**; **Estebanell**; **Brusi**, 2020). Dentro de este último concepto es donde encontramos los llamados juegos serios o *serious games*, cuyo nacimiento y diseño está enfocado a objetivos concretos de aprendizaje (**Campal**; **Ordás**, 2021) en contraste con el juego (*gaming*, *video gaming*) orientado al entretenimiento, independientemente de que pueda ser utilizado también con fines educativos.

El videojuego, además de una de las industrias del entretenimiento con mayor crecimiento (**García**, 2019) y elemento de la cultura popular, constituye en su vertiente de juego serio (**Michael**; **Chen**, 2005) un fantástico instrumento de aprendizaje (**Smale**, 2011; **Marín-Díaz**, 2013; **Díaz-Delgado**, 2018) tanto por su popularidad, como por su atractivo y posibilidades, que puede ser de gran utilidad en el campo de las bibliotecas para la alfabetización informacional (**Calderón-Rehecho**, 2015).

El presente trabajo plantea como objetivo principal evaluar la utilidad del videojuego, en su modalidad de juego serio, como instrumento de aprendizaje autónomo en alfabetización informacional (alfin) en estudiantes de grado universitario, a través de un desarrollo *ad hoc* basado en el análisis de las consultas de información identificadas en la biblioteca universitaria.

1.1. Alfabetización informacional / competencias digitales

La sociedad de la información y el uso generalizado de internet han ocasionado un mundo saturado de información con problemas que se acrecientan, como la falta de capacidad de la ciudadanía para identificar información pertinente y veraz, o su desconocimiento sobre el uso de fuentes y recursos adecuados para localizar información fiable y precisa (**Pinto-Molina**, 2019).

La alfin, entendida tradicionalmente como la capacidad para reconocer cuándo se necesita una información, así como la capacidad para localizarla, evaluarla y usarla efectivamente (*ALA*, 1989) ha evolucionado al ritmo de la sociedad a lo largo de los años, hacia enfoques más pluralistas e integradores, promoviendo una ciudadanía crítica que sepa evaluar y usar la información para la resolución de problemas en su contexto y fomente el aprendizaje autónomo, a través de alfabetizaciones múltiples que permitan hacer frente a las nuevas necesidades. Surgen así modelos como AMI/MIL (Alfabetización Mediática e Informacional / *Media Information Literacy*), propuesto por la *Unesco*, que incorporan a la alfin otras alfabetizaciones tecnológicas de tipo digital y mediáticas (*Media Literacy*), donde aparecen nuevos componentes destinados también a la creación de la información y contenido multimedia para esta nueva ciudadanía consumidora y productora de información (prosumidora) que participa en entornos colaborativos.

El concepto de alfin original se desarrolla como marco intelectual para comprender, encontrar, evaluar y utilizar la información, donde el manejo de la tecnología de la información cobra protagonismo por la propia naturaleza de la información, pero centrando el foco sobre el discernimiento crítico y el razonamiento *(ACRL*, 2000), con una visión más amplia hacia una metaalfabetización que requiere compromisos de comportamiento, afectivos, cognitivos y metacognitivos con el ecosistema de información que permita el aprendizaje a lo largo de la vida (*ACRL*, 2015).

La alfabetización se vuelve, por tanto, esencial para poder empoderarnos como ciudadanos, para alcanzar y expresar puntos de vista informados, comprometernos plenamente con la sociedad y poder participar de forma significativa en esta nueva sociedad del conocimiento del siglo XXI (*Intef*, 2017; *Cilip*, 2018). Para conseguirlo y hacer frente a los retos actuales, como la sobresaturación informativa, la inteligencia artificial o las noticias falsas, la alfabetización es la base para que la ciudadanía pueda adquirir las competencias mediáticas, informacionales y digitales necesarias, entendiendo las competencias como

> "el conjunto de conocimientos, habilidades y cualidades personales adquiridas mediante esfuerzos deliberados, sistemáticos y sostenidos para llevar a cabo con éxito determinadas actividades" (**Pinto-Molina**, 2019).

En este contexto es importante destacar el trabajo del *Joint Research Centre* (*JCR*) que ha dado lugar al *Marco Europeo de Competencias Digitales para la Ciudadanía*, conocido como *DigComp* (*European Commission. Joint Research Centre*, 2022) y que se ha convertido en una referencia en competencia digital, desde su inicio en 2013 hasta su última actualización en 2022 (*DigComp 2.2*), siendo adaptada en nuestro país por *Rebiun*, para estudiantes de grado universitario (*Rebiun*, 2016).

Se identifica la competencia digital como una de una de las competencias clave para el aprendizaje permanente e

> "implica el uso seguro, crítico y responsable de las tecnologías digitales y la participación en ellas para el aprendizaje, el trabajo y la participación en la sociedad. Incluye la alfabetización informativa y de datos, la comunicación y la colaboración, la alfabetización mediática, la creación de contenidos digitales (incluida la programación), la seguridad (incluido el bienestar digital y las competencias relacionadas con la ciberseguridad), las cuestiones relacionadas con la propiedad intelectual, la resolución de problemas y el pensamiento crítico" (*Rebiun*, 2016).

La competencia digital se define como un conjunto de 21 competencias agrupadas en cinco áreas:

- alfabetización informacional y de datos;
- comunicación y colaboración;
- creación de contenidos digitales;
- seguridad; y
- resolución de problemas.

Dentro del área 1, correspondiente a alfabetización informacional, en la que queremos centrar nuestro trabajo, se identifican las siguientes competencias:

> 1.1. Navegar, buscar y filtrar datos, información y contenidos digitales: expresar las necesidades de información, buscar datos, información y contenidos en entornos digitales, acceder a ellos y navegar entre ellos. Crear y actualizar estrategias personales de búsqueda.
>
> 1.2. Evaluar datos, información y contenidos digitales: analizar, comparar y evaluar críticamente la credibilidad y fiabilidad de las fuentes de datos, información y contenidos digitales, así como analizar, interpretar y evaluar críticamente los datos, la información y los contenidos digitales.
>
> 1.3. Gestionar datos, información y contenidos digitales: organizar, almacenar y recuperar datos, información y contenidos en entornos digitales. Organizarlos y procesarlos en un entorno estructurado.

Los profesionales de la información desempeñan un papel fundamental en el proceso de alfin, especialmente en el ámbito universitario en el que es frecuente que el personal de las bibliotecas imparta formación con estos contenidos ya sea de manera extracurricular o intracurricular, mediante la colaboración entre docentes y bibliotecarios (**Manso-Perea**; **Cuevas-Cerveró**; **González-Cervantes**, 2019) y es en este contexto donde la utilización del videojuego en su modalidad de juego serio, diseñado para la adquisición de estas competencias, puede convertirse por sus características intrínsecas en una herramienta de gran utilidad para poder conseguirlo (**Bezanilla** *et al.*, 2014).

1.2. Estado de la cuestión

Como paso previo al inicio de las intervenciones se ha realizado una revisión de la bibliografía para acercarnos al estado de la cuestión, consultando las bases de datos multidisciplinares *Dialnet*, *Scopus* y *Web of Science*, y *Lisa*, especializada en Información y Documentación. Para la estrategia de búsqueda se han utilizado truncamientos y operadores para la combinación de los términos "jueg*| videojueg*| gam*| videogam*", "alfabetización informacional"| "competencias informacionales"| "information literacy"| "information competence" (figura 1), seleccionando artículos de revistas, revisiones y actas de congresos, sin establecer límite cronológico debido a que las experiencias identificadas son recientes y se remontan hasta 2005.

Se han identificado 46 documentos que analizan o revisan experiencias reales de aplicación de videojuegos al campo de la alfin. El 65% de los artículos identificados corresponden a los últimos 5 años (>2016), si bien el volumen de las publicaciones ha aumentado de manera global en los últimos años, podemos constatar un interés actual por el tema objeto de estudio.

> El papel predominante de las bibliotecas en el aprendizaje de las competencias informacionales ha llevado también a sus profesionales a poner en práctica experiencias de ludificación y de aprendizaje basado en juego

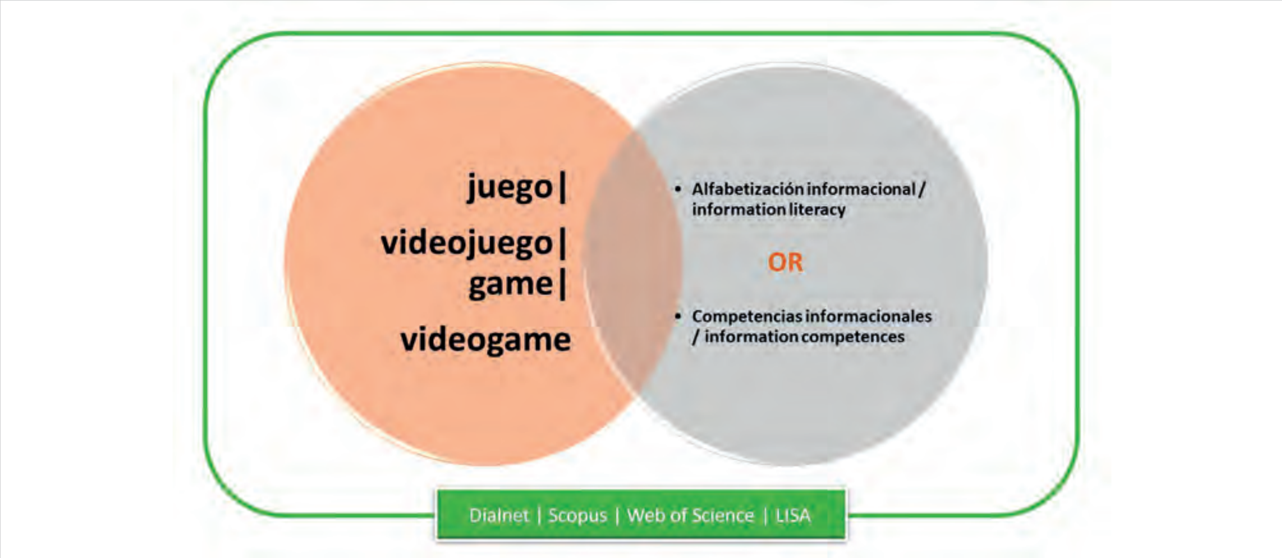

Figura 1. Estrategia de búsqueda

Debemos destacar entre los trabajos seleccionados las revisiones de **Smale** (2011), **Snyder-Broussard** (2012) y la posterior continuación de **Urban** (2019), esenciales para realizar un seguimiento de la historia de la aplicación de los juegos serios digitales al campo de las bibliotecas, principalmente en los Estados Unidos.

El personal de la biblioteca, como responsables de las formaciones en alfin, especialmente en educación superior, denotan una preocupación por buscar la motivación y participación del alumnado en sus acciones formativas, que en muchos casos se limitan a sesiones puntuales y de corta duración (**Van-Meegen**; **Limpens**, 2010; **Smale**, 2011; **Kearns**; **Kirsch**; **Cononie**, 2017).

Las experiencias son muy variadas, desde los intentos iniciales de trasladar juegos televisivos (**Leach**; **Sugarman**, 2005; **Walker**, 2008), las bibliotecas han experimentado con todo tipo de herramientas en función de su finalidad o recursos disponibles:

- modificaciones de juegos comerciales (**Clyde**; **Thomas**, 2008; **Ponce-Carrillo**; **Alarcón-Pérez**, 2020);
- juegos de realidad alternativa (**Battles**; **Glenn**; **Shedd**, 2011);
- uso de QR y realidad aumentada (**Fitz-Walter** *et al.*, 2012; **Wang** *et al.*, 2013; **Tang**, 2021);
- experimentos en *Second Life* (**Hill**; **Knutzen**, 2017).

El conjunto de experiencias identificadas se centra mayoritariamente en bibliotecas estadounidenses, en educación superior y en idioma inglés. En Europa podemos destacar el *Proyecto Navigate* (**Valero-Gisbert**; **Cabassi**; **Longhi**, 2021), financiado por el programa *Erasmus+* de la UE y coordinado por la *University of Library Studies and Information Technologies* (*Sulsit*) de Sofía (Bulgaria).
https://www.navigateproject.eu

Los estudios constatan reacciones positivas y una mejora de la participación y motivación por parte del alumnado (**Van-Meegen**; **Limpens**, 2010; **Battles**; **Glenn**; **Shedd**, 2011; **Sullivan**; **Critten**, 2014; **Jones**; **Wisniewski**, 2019; **Ponce-Carrillo**; **Alarcón-Pérez**, 2020; **Wang** *et al.*, 2020; **Tang**, 2021), especialmente cuando el juego se realiza de manera colaborativa e incluye elementos competitivos (**Gleason**, 2015; **Jones**; **Wisniewski**, 2019; **Zou** *et al.*, 2021). Además, el ambiente informal contribuye a romper los estereotipos tradicionales de la biblioteca, permitiendo la interactuación con las personas que utilizan la biblioteca de una manera relajada (**Leach**; **Sugarman**, 2005; **Walsh**, 2020).

Para contribuir a una experiencia exitosa, el videojuego debe estar alineado con los objetivos de aprendizaje y proporcionar diversión (**Gumulak**; **Webber**, 2011; **Snyder-Broussard**, 2012; **Walsh**, 2020), lo que permitirá obtener un mayor compromiso. Del mismo modo, es importante contar con un sistema de recompensas (tablas de clasificación, insignias, premios tangibles, etc.) o realizar acciones de marketing, preferiblemente en colaboración con otras instituciones o servicios, que fomenten la participación del estudiantado (**Walker**, 2008; **Battles**; **Glenn**; **Shedd**, 2011; **Martin**; **Martin**, 2015; **Christe**; **Bhatt**, 2017; **Kearns**; **Kirsch**; **Cononie**, 2017; **Wang** *et al.*, 2020). Si se desea que los usuarios jueguen de manera voluntaria y autónoma, los videojuegos enfocados a alfin deberán contar con los estándares de calidad que esperan, en consonancia con la oferta comercial (**Battles**; **Glenn**; **Shedd**, 2011; **Snyder-Broussard**, 2012).

En cuanto a su implementación como medio de aprendizaje, el videojuego se suele usar como complemento de los programas formativos de la biblioteca que permita enriquecerlos y fomente la interactividad (**Van-Meegen**; **Limpens**, 2010). Esta modalidad se debe en parte a las limitaciones de las bibliotecas para su desarrollo, que en muchos casos parten de iniciativas locales con escasos recursos que dificultan la jugabilidad y que inciden en el fracaso, abandono y discontinuidad de dichos videojuegos (**Martin**; **Martin**, 2015). Constituye una de las principales limitaciones identificadas, existiendo un número muy reducido que puedan ser jugados libremente en la actualidad y corresponden fundamentalmente a iniciativas recientes. Algunos ejemplos que podemos destacar son:

- *NewsFeed Defenders*;
  https://www.icivics.org/games/newsfeed-defenders
- *BadNews*;
  https://www.getbadnews.com
- *The Navigator*;
  https://www.navigateproject.eu/navigator
- *Information Trap Manager*;
  https://www.navigateproject.eu/itm
- *Aparaattisaari* (*Gadget Island*);
  https://www.aparaattisaari.fi/en/index.html
- *Zombies ate my evidence*
  https://www.lib.uiowa.edu/hardin/zombies-ate-my-evidence
- *Goblin threat*
  https://www.lycoming.edu/library/plagiarism-game

2. Metodología

2.1. Diseño experimental

Para evaluar la utilidad del videojuego como herramienta de alfin, se planificó un experimento piloto de caso único y metodología cuantitativa cuasi experimental, a partir del desarrollo local de un videojuego que diera respuesta a necesidades de información habituales en una biblioteca universitaria, utilizando para la recogida de datos la cumplimentación anónima de un pretest inicial y un postest, que permitiera evaluar el grupo antes y después de jugar al videojuego, y establecer comparaciones (figura 2).

La intervención se realizó en una franja horaria disponible para seminarios dentro de la planificación docente de la *Facultad de Enfermería, Fisioterapia y Podología* (*FEFP*), solicitando la participación voluntaria por parte del alumnado.

La organización del experimento llevó aparejadas las siguientes acciones previas:

- Solicitud de autorización a la *Comisión de Investigación* de la *FEFP* para su realización.
- Petición a la coordinación de los grados de Enfermería, Fisioterapia y Podología su ayuda para la difusión entre los estudiantes.
- Solicitud a la *Unidad de Orientación y Difusión* de la *UCM* de material promocional para los asistentes, que ayudara a fomentar la participación.
- Reserva de 3 aulas con capacidad para más de 100 estudiantes que permitieran cumplir con el protocolo Covid.
- Instalación de cartelería informativa en los espacios de las bibliotecas de la *FEFP* y de *Medicina*.

Para la inscripción en la actividad se dispuso un formulario web que se distribuyó a la delegación de estudiantes de las distintas titulaciones de la *FEFP*, a grupos de estudiantes de las *Facultades de Informática*, *Derecho* y *Filosofía*, y se incorporó a través de código QR a la cartelería que se instaló en las bibliotecas de la *FEFP* y de *Medicina*.

El transcurso de la intervención no excedió la hora de duración, estableciendo una duración media de 7 minutos para la realización de cada prueba y de entre 15 y 30 minutos para la realización del videojuego, participando 14 estudiantes (57,14% mujeres y 42,86% hombres) de entre 18 y 32 años, principalmente de primer curso del grado de enfermería (78,57%).

Figura 2. Diseño de la intervención

2.2. Instrumentos

2.2.1. Necesidades de información en la biblioteca universitaria

Para tratar de identificar las demandas de información más habituales en una biblioteca universitaria se ha partido de las consultas recibidas en la *Biblioteca* de la *Universidad Complutense de Madrid* (*BUC*), proporcionadas por el *Servicio de Evaluación de Procesos y Centros*[1]. Se han analizado y categorizado 1.639 consultas registradas en un período de dos años (tabla 1), excluyendo las consultas recibidas tras la entrada del estado de alarma derivado de la crisis sanitaria de la Covid-19, para evitar distorsiones en los resultados.

En función de la particularidad de las consultas / informaciones registradas, podemos identificar dos grandes grupos:

- Consultas / informaciones de carácter particular según el tipo, normativa por la que se rija o servicios que ofrezca: plazos de préstamo, normativa de acceso, horarios, etc. En este apartado podemos incluir las consultas pertenecientes a las categorías "préstamo", "acceso a recursos" e "información general" (35,75% del total).
- Consultas / informaciones comunes al conjunto de bibliotecas por tratarse de metodologías, herramientas o estándares de uso generalizado: metodología de búsqueda, utilización de bases de datos, estilos bibliográficos, etc. Se incluyen las consultas recibidas en las categorías: "catálogo / búsquedas básicas", "bases de datos / búsquedas avanzadas" y "bibliografía / gestores de referencias" (48,26% del total).

Tabla 1. Consultas recibidas en la *BUC* (feb. 2018 - feb. 2020)

	N. consultas	%
Catálogo / búsquedas básicas	455	27,76
Bases de datos / búsquedas avanzadas	275	16,78
Bibliografía / Gestores de referencias	61	3,72
Acceso a recursos	53	3,23
Préstamo	438	26,72
Información general	95	5,80
Otros	262	15,99
Total	1.639	100

2.2.2. Videojuego *El último examen*

Con el objeto de evaluar el impacto del videojuego como herramienta de alfin se ha optado por el desarrollo *ad hoc* del videojuego 3D *El último examen* sobre el motor de videojuegos *Unity* (figura 3).

Puesto que el desarrollo en *Unity* requiere la instalación del juego en los equipos, para facilitar la intervención se optó por su publicación en la plataforma *Simmer.io* que permite jugar y compartir desarrollos en *Unity* a través de un entorno web.
https://simmer.io/@Oliver_UCM/ultimo-examen

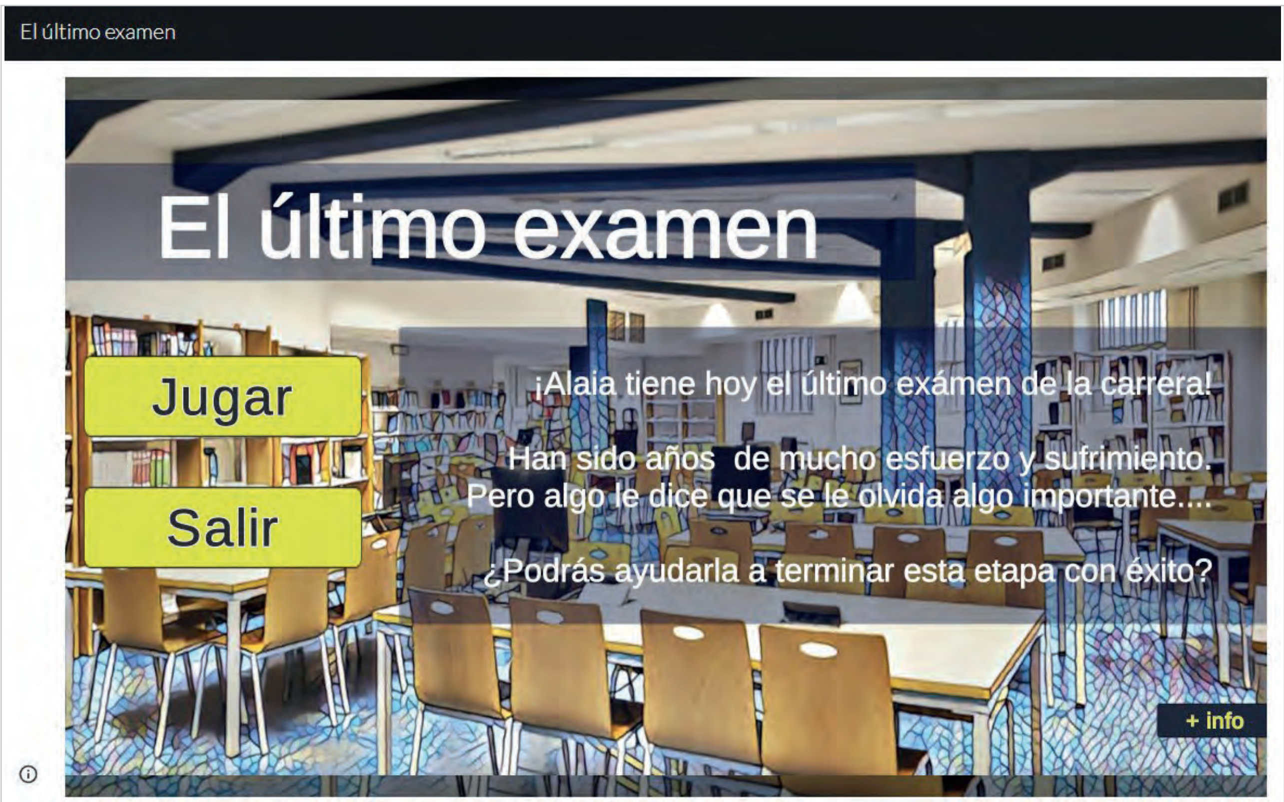

Figura 3. Home del videojuego *El último exámen*
https://sites.google.com/ucm.es/ultimo-examen

La narrativa del juego consiste en una estudiante universitaria que acude a la Facultad para realizar el último examen de carrera y obtener su título universitario, siendo necesario completar previamente 3 tareas requeridas por su profesor:

- conseguir un manual de estudio de la biblioteca de la Facultad previa consulta del catálogo (figura 4);
- buscar artículos en una base de datos bibliográfica sobre un determinado tema de investigación;
- asistir a un curso de la biblioteca sobre el gestor de referencias *Mendeley*.

> La narrativa de *El último examen* consiste en una estudiante universitaria que acude a la Facultad para realizar el último examen de carrera y obtener su título universitario, siendo necesario completar previamente 3 tareas requeridas por su profesor

El videojuego tiene como objetivo de aprendizaje dar respuesta a algunas de las consultas más habituales identificadas en la biblioteca, comunes al conjunto de bibliotecas, y contribuir a la adquisición de las competencias informacionales 1.1 y 1.3 en un nivel inicial correspondientes al área 1 "Información y tratamiento de datos" que se relacionan en el *Marco de Competencia Digital* para estudiantes de grado, realizado por *Rebiun* como adaptación de las *DigComp* a nuestro entorno.

1.1. Navegación, búsqueda y filtrado de información, datos y contenidos digitales.

- Identificar el catálogo como herramienta principal para localizar un manual en la biblioteca: la protagonista deberá localizar en la biblioteca el manual requerido para poder hacer el examen.
- Aprender que la signatura topográfica identifica la ubicación física del libro: para conseguir el título solicitado, se deberá facilitar a la bibliotecaria la signatura topográfica del manual obtenido tras la consulta del catálogo.
- Identificar la base de datos bibliográfica como fuente de información principal para localizar artículos de revistas: deberá realizar una búsqueda en una base de datos para obtener un listado de artículos científicos sobre el tema solicitado.
- Aprender el funcionamiento básico de los operadores de búsqueda: la protagonista deberá introducir una estrategia de búsqueda con la combinación de operadores AND, OR y NOT y la utilización de paréntesis para su agrupación (artículos sobre diabetes y obesidad, que afecten a niños o ancianos, pero no de Covid).

1.3. Gestión de información, datos y contenidos digitales

- Conocer la existencia de los gestores bibliográficos e identificar alguno de ellos: la protagonista deberá inscribirse y participar en un curso de formación de la biblioteca sobre *Mendeley*.

Como objetivo transversal se pretende identificar la figura del personal de la biblioteca como referente en el entorno universitario en caso de necesidad de información, puesto que el personaje de la bibliotecaria será el responsable de dar orientaciones y pistas para la consecución de los objetivos.

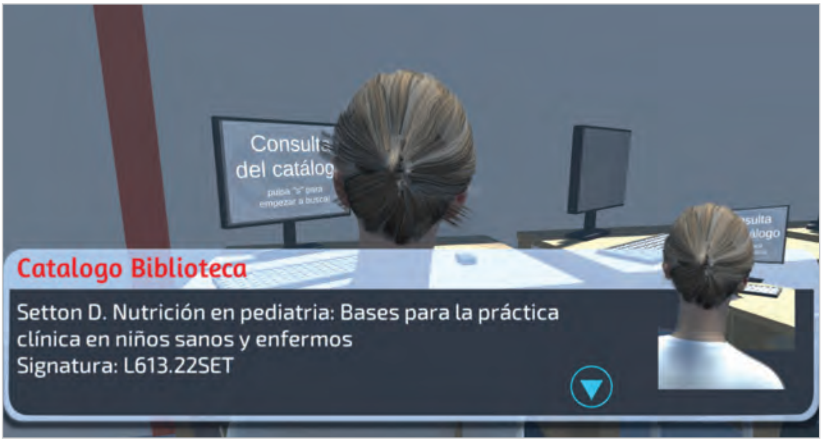

Figura 4. Videojuego *El último examen*. Consulta del catálogo

En base a los 6 tipos de jugadores establecidos por **Marczewski** (2015) el videojuego ofrece al jugador de tipo "triunfador" y "jugador" un desafío de búsqueda y la oportunidad de aprender a través de la consecución de las tres tareas. Para conseguirlas deberá conversar con otros personajes que le guiarán para desbloquear y conseguir las recompensas, motivando a los jugadores de tipo "socializadores". El diseño del juego no establece un orden para conseguir las recompensas, ofreciendo al jugador de tipo "espíritu libre" la posibilidad de elegir su camino y explorar el entorno.

Figura 5. Videojuego *El último examen*. Biblioteca

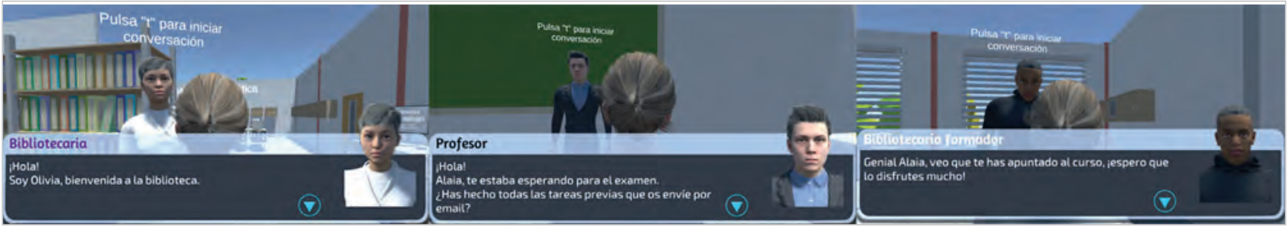

Figura 6. Videojuego *El último examen*. Personajes

El juego recrea distintos espacios habituales en una Facultad universitaria (biblioteca –figura 4–, el aula de formación de la biblioteca y el aula de examen) de modo que, tanto la narrativa como su apariencia consiga conectar con el jugador objetivo logrando un sentimiento de comunidad. Los personajes con los que deberá conversar e interactuar a lo largo del videojuego serán una bibliotecaria (información bibliográfica), un bibliotecario formador y el profesor de la asignatura (figura 5).

2.2.3. Tests

Puesto que no se identificó ningún instrumento validado de evaluación de competencias informacionales en el ámbito universitario, se optó por la elaboración de un cuestionario para la recogida de datos que permitiera medir el impacto tras la intervención mediante un prestest / postest[2] anónimo con idénticas preguntas, estructuradas en 4 apartados (tabla 2).

Tabla 2. Estructura del test

Instrumento	Tipo	Cómo se calcula	Número de items	Rango
Uso y percepción de la biblioteca	Escala de Likert de 5 puntos	Suma de los valores de cada ítem	6	[1-5]
Alfabetización informacional	Respuesta múltiple con una respuesta válida	Cada ítem contribuye con 1 al total si la respuesta es correcta, 0 si es incorrecta	12	[0-12]
Satisfacción con la intervención	Escala de Likert de 5 puntos	Suma de los valores de cada ítem	1	[1-5]
Repetición de la intervención (postest)	Sí / No	Suma de los valores de cada ítem	1	[0-1]

El punto de partida para el diseño del cuestionario es la reflexión de los investigadores acerca del objeto de estudio y los objetivos de aprendizaje definidos para el videojuego en base a las consultas de información analizadas previamente, relacionadas con competencias informacionales necesarias para los estudiantes de grado (*Rebiun*, 2016). El cuestionario fue evaluado por 4 personas expertas (**Escobar-Pérez**; **Cuervo-Martínez**, 2008), responsables de bibliotecas con amplia experiencia en alfabetización informacional y formación en biblioteca, que realizaron mejoras y aportaciones al cuestionario inicial.

La estructura del cuestionario se compone de un grupo de preguntas de rendimiento típico, correspondientes al uso y percepción de la biblioteca, así como la satisfacción con la intervención, y un grupo de preguntas de rendimiento óptimo para evaluar los conocimientos e impacto de la intervención sobre los conceptos de alfabetización informacional planteados.

3. Resultados

Tomando como base el diseño de las pruebas, podemos establecer 3 categorías para el análisis de los datos, correspondientes al uso y percepción que tienen los participantes sobre la biblioteca, conocimientos relativos a alfabetización informacional y evaluación de la experiencia.

3.1. Uso y percepción de la biblioteca

En cuanto a la frecuencia con que acuden a la biblioteca según los datos del pretest, el 50% lo hace raramente (1 o 2 veces por año) frente al 14,29% que lo hace muy frecuentemente (3 o más veces por semana), aunque el 71,34% se muestran motivados o totalmente motivados para acudir (tabla 3). No se aprecian variaciones significativas en los resultados del postest.

Tabla 3. Frecuencia de uso de la biblioteca

Frecuencia de uso de la biblioteca	Pretest	Porcentaje	Postest	Porcentaje
Muy frecuentemente	2	14,29	2	14,29
Frecuentemente	3	21,43	3	21,43
Ocasionalmente	2	14,29	3	21,43
Raramente	7	50,00	6	42,86
Nunca	0	0,00	0	0,00

Aproximadamente la mitad (42,86% en pretest / 50% postest) consideran que las bibliotecas son divertidas y dinámicas, frente al 28,57% del pretest que se encuentra en desacuerdo o totalmente en desacuerdo, y un 28,57% que no se posiciona (ni acuerdo, ni desacuerdo). Los datos del postest no muestran variaciones significativas.

En cuanto a la valoración que realizan de la biblioteca el 92,86% se manifiestan inicialmente satisfechos o totalmente satisfechos, alcanzando el 100% en los datos del postest.

> El videojuego recrea distintos espacios habituales en una facultad universitaria (biblioteca, el aula de formación de la biblioteca y el aula de examen) de modo que, tanto la narrativa como su apariencia consiga conectar con el jugador logrando un sentimiento de comunidad

Respecto a sus habilidades para encontrar información, el 89,86% definieron en el pretest sentirse satisfechos o totalmente satisfechos, descendiendo al 64,28 en el postest (tabla 4).

Tabla 4. Satisfacción de habilidades informacionales

Satisfacción de habilidades de información	Pretest	Porcentaje	Postest	Porcentaje
Totalmente satisfecho	2	14,29	1	7,14
Satisfecho	11	78,57	8	57,14
Algo satisfecho	1	7,14	2	14,29
Insatisfecho	0	0,00	2	14,29
Totalmente insatisfecho	0	0,00	1	7,14

3.2. Alfabetización informacional

Cada participante contestó en su totalidad las 12 preguntas sobre alfabetización informacional de ambas pruebas, obtenido una media de aciertos del 53,75% en la prueba inicial y un 85,71% tras la intervención (tabla 5).

Tabla 5. Valoración en alfabetización informacional

Prueba	N	Media	Desviación estándar	Media de error estándar
Pretest	14	53,571	15,917	4,254
Postest	14	85,714	12,839	3,431

Con el objetivo de comprobar si los grupos son homogéneos o no, realizamos la prueba de Shapiro-Wilk (específica para muestras reducidas). Esto nos ayuda a comprobar si podemos utilizar una prueba paramétrica (tabla 6).

Tabla 6. Prueba Shapiro-Wilk

Estadístico	gl	Sig.
0,953	14	0,610

En este caso, los resultados nos indican que tenemos un grupo homogéneo por lo que, a pesar del reducido tamaño muestral, procedemos a realizar la prueba paramétrica de t de Student (**Rubio-Hurtado**; **Berlanga-Silvente**, 2012) para muestras relacionadas (tabla 7).

Tabla 7. Prueba t de Student de muestras relacionadas

			5% de nivel de confianza de la diferencia				
Media	Desviación estándar	Media de error estándar	Inferior	Superior	t	gl	Sig. (bilateral)
-32,143	15,627	4,177	-41,166	-23,120	-7,696	13	<,001

3.3. Intervención

En relación con la valoración de la intervención, el 92,85% de los participantes se mostraron satisfechos (57,14%) o totalmente satisfechos (35,71%), no recibiendo ninguna valoración negativa en este apartado. En cuanto a su intención sobre volver a participar de nuevo, el 100% constató que volverían a repetirla.

4. Discusión y conclusiones

El personal de las bibliotecas, como parte principal de los procesos de formación en el campo de la información, especialmente en el ámbito universitario, se enfrentan a los mismos retos y problemas que el resto de los docentes, incrementados en muchas ocasiones por el escaso tiempo del que disponen para las formaciones y su carácter voluntario y extracurricular. Por este motivo han demostrado interés en experimentar con metodologías de carácter menos tradicional como la gamificación y el aprendizaje basado en juego que permita mejorar el impacto y calidad de sus acciones formativas.

En base a los resultados de la intervención se ha podido constatar cómo el videojuego, en su vertiente de juego serio, se muestra efectiva como herramienta para el aprendizaje en el campo de la alfin en estudiantes universitarios, permitiendo un aumento significativo (32,14%) en los porcentajes de acierto globales tras la intervención y en todos los items evaluados en este apartado, contribuyendo a mejorar algunas de las competencias informacionales necesarias en los estudiantes de grado universitario (*Rebiun*, 2016). Igualmente, la alta valoración de la intervención (92,85% se mostraron satisfechos o totalmente satisfechos) y su interés por repetirla, la presentan como una metodología atractiva y motivadora que fomenta la participación, constituyendo por tanto una oportunidad que las bibliotecas deben aprovechar (**Calderón-Rehecho**, 2015).

> Los bibliotecarios se enfrentan a los mismos retos y problemas que el resto de los docentes, incrementados en muchas ocasiones por el tiempo limitado de las formaciones y su carácter voluntario y extracurricular

La participación permitió al alumnado evaluar sus habilidades reales para acceder a la información, que partían de unos altos niveles iniciales de satisfacción (el 89,86% se mostraron satisfechos o totalmente satisfechos) y que descendió tras jugar el videojuego (64,28%), lo que contribuye a que tomen conciencia sobre su desconocimiento en algunos aspectos que ignoraban previamente y el margen de mejora para su aprendizaje en este campo.

Aunque todas las personas participantes son estudiantes de grado universitario, no son habituales de la biblioteca, puesto que la mitad estableció en el pretest que acudían únicamente 1 o 2 veces al año, y apenas un 14,29% lo hace 3 o más veces por semana. A pesar de esto, sí se establece una alta satisfacción con este servicio, tanto antes como después de la intervención, y aproximadamente la mitad se muestran de acuerdo en que se trata de un servicio divertido y dinámico, percepción que no se modifica tras la prueba. Igualmente, no se establecen cambios significativos en los participantes en cuanto a la frecuencia de uso de la biblioteca. Por consiguiente, en este caso no se detecta influencia del videojuego en su percepción con respecto a la biblioteca o el uso de esta.

El desarrollo de un videojuego es un proceso que consume gran cantidad de recursos, por ese motivo, *El último examen* ha buscado dar solución a respuestas globales extrapolables al mayor número de personas posible que permita rentabilizar la inversión. Sin embargo, un porcentaje considerablemente de las consultas recibidas (36,75%) en la biblioteca corresponden a cuestiones de carácter local (plazos de préstamo, normativa de acceso, horarios, entre otros) que son igualmente importantes y que quedan sin respuesta, por lo que podría ser interesante para trabajos futuros ampliar y personalizar el desarrollo actual o la creación de nuevos videojuegos de orientación local que permita cubrir estas lagunas.

Todas las personas que participaron finalizaron el videojuego de manera autónoma a pesar de que su diseño ofrece la libertad de explorar los espacios y elegir su propio camino, lo que demuestra que la narrativa del videojuego se muestra efectiva para su resolución de manera autónoma sin necesidad de apoyo adicional. En cuanto a los tiempos de resolución, los resultados fueron muy dispares, en parte debido a su pericia como jugadores, o el tiempo invertido en la exploración del entorno, pero también influyó el equipamiento informático y la conexión wifi, que produjo algunas incidencias y ralentizó los tiempos de carga del juego, lo que deberá tenerse en cuenta para futuros desarrollos e intervenciones.

Sin embargo, a pesar de los resultados positivos en cuanto a la satisfacción, la realidad es que la participación de los estudiantes fue muy baja, lo que pone en duda la capacidad de este tipo de videojuegos para atraer a los estudiantes de manera espontánea.

Ante esta realidad deberíamos reflexionar sobre los motivos y la capacidad de mejora para lograr ese acercamiento voluntario. Algunos de ellos:

- necesidad de realizar desarrollos profesionales acordes al estándar comercial con equipos multidisciplinares;
- realización de campañas de marketing que permitan dar a conocer de manera atractiva el producto
- incorporación de premios o recompensas.

Estas dificultades no deben llevarnos a cuestionar el uso del videojuego, puesto que sus virtudes y fortalezas están acreditadas, pero sí que influirán en su manera de utilizarlo, principalmente a través de su incorporación como un elemento más en las formaciones, ya sean presenciales o virtuales. Una posibilidad interesante es la de utilizarlos a modo de introducción de algunos temas o conceptos, como refuerzo, o bien como evaluación de estos, integrados dentro del diseño instruccional en un entorno docente o un programa de competencias informacionales más amplio, lo que constituye una interesante línea de trabajo futuro.

Hemos podido constatar cómo esta situación ha servido para que los participantes tomaran conciencia sobre sus habilidades reales para localizar información, algo especialmente valioso que podemos aprovechar como paso previo a la hora de afrontar una formación, potenciando su recepción y motivación ante los contenidos que se van a impartir, al tiempo que posiciona de manera atractiva al profesional de la biblioteca lejos de estereotipos

> La participación permitió a los estudiantes darse cuenta de sus habilidades reales para acceder a la información, lo que contribuye a que tomen conciencia sobre su desconocimiento en algunos aspectos y el margen de mejora para su aprendizaje en este campo

preconcebidos antes de iniciar esa formación. Es en esa conjunción entre el videojuego y la formación tradicional donde ambas pueden ganar potencialidad y enriquecer la experiencia de todos los participantes.

5. Limitaciones del estudio

La muestra del objeto de estudio, el análisis de las demandas de información y el nivel del desarrollo del videojuego presentan limitaciones de carácter práctico. Dado que el mayor esfuerzo de difusión y la realización de la actividad se desarrolló en la *Facultad de Enfermería, Fisioterapia y Podología*, el perfil de los participantes arroja un importante sesgo de estudiantes del Grado de Enfermería (78,57%) y un volumen de participantes menor del esperado, probablemente influido por la planificación semipresencial del citado curso académico derivada de la situación sanitaria provocada por el coronavirus.

Por estos motivos el presente trabajo y sus resultados deben ser tomados como piloto y como punto de partida para futuras investigaciones.

6. Notas

1. Información del registro manual de las consultas recibidas de forma presencial y virtual (formularios, correo electrónico y teléfono):
https://biblioteca.ucm.es/formularios

2. Test disponible en *Zenodo*:
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Profiling the most highly cited scholars from China: Who they are. To what extent they are interdisciplinary

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Abstract

Since the beginning of the 21st century, an increasing number of Chinese researchers have joined the ranks of the world's top scientists. Some international organizations have observed this phenomenon and ranked the world's top Chinese researchers. However, investigation of highly cited interdisciplinary research (IDR) scholars is insufficient, although IDR tends to have a greater social impact. Looking at the top 2% of the world's Chinese scholars, this study analyzes the structural attributes of IDR by those top scholars in detail using network analysis, cluster analysis, block modeling, and quadratic assignment procedure analysis. The results show that the proportion of highly cited scholars in technical categories is higher than in social categories. The fields of artificial intelligence and image processing, oncology and carcinogenesis, plus neurology and neurosurgery serve as bridges across disciplines, with materials, energy, and artificial intelligence and image processing having higher eigenvector centrality. The field of social sciences has the widest range of IDR activities, but cooperation within this field is low. Forty-two of the world's first-class universities are in China, and of the world's top 2% scholars who come from China, 46.3% work for these institutions. The research themes of highly cited academics from World First-Class universities in China are most similar to the themes of scholars from universities in China with first-class academic disciplines. There are differences between non-university and university scholars in terms of research topics. It is suggested that the government can promote a triple-helix effect (public institute, industrial enterprise, and research school) so that organizations of different natures can produce synergistic effects.

Keywords

Interdisciplinary research; Scholarly communication; Researchers; Scientists; Highly cited scholars; Network analysis; Cluster analysis; Block modeling; Quadratic assignment procedure; China.

1. Introduction

The world has entered the era of Industry 4.0 with its complexity of society and knowledge in which the solutions to complex problems may be unclear, requiring an interdisciplinary approach (**Zeng** *et al.*, 2017). Interdisciplinarity combines approaches from different disciplines to solve specific problems (**Glänzel**; **Debackere**, 2021). The integration of science, technology, and society has promoted diversification in scientific research. Interdisciplinary collaboration often leads to collective creativity (**Moirano** *et al.*, 2020) and is of great significance to sustainable development in the scientific community (**Yarime** *et al.*, 2012). With the development of interdisciplinary research (IDR) and its expansion of the scope of scientific research, IDR tends to be more efficient and has a greater social impact (**Chen** *et al.*, 2015). Therefore, by studying the interdisciplinary status of highly cited scholars in a region, researchers can grasp the region's overall scientific research and development trends and motivations in various fields.

> Interdisciplinary collaboration often leads to collective creativity and is of great significance to sustainable development in the scientific community

Since the beginning of the 21st century, China and other countries have not only become more open to trade but have also made rapid progress in science and technology (**Zhang** *et al.*, 2021; **Zheng** *et al.*, 2012). At present, China has joined the United States in influencing the development of the world's political and economic sciences. The structure of research has changed dramatically over the last 20 years. Globalization of markets and developments in technology and communication are rapid. New and more complex social problems urgently need interdisciplinary professionals to solve them (**Zeng** *et al.*, 2017). In this international context, China has been undergoing rapid academic development, and the number of globally renowned Chinese researchers is increasing. Several international organizations have ranked the influence of Chinese researchers on the global academic community. For example, since 2015 *Elsevier* (2021) has annually published a report titled *Highly Cited Chinese Researchers*. However, there is insufficient investigation of scientific development in China in terms of interdisciplinarity. Thus, analysis and in-depth understanding of the profiles of highly cited scholars in China is necessary.

This study uses networks, clusters, quadratic assignment procedure (QAP) analyses, and block modeling to analyze the top 2% of the world's scholars. This study is aimed at grasping the distribution of China's top researchers, the relationships between disciplines, and differences between categories of organizations. In doing so, specific suggestions are proposed for the development of science in China, which will also be valuable for the development of science in other countries and regions.

2. Literature review

Since 1990, China's academic fields have been steadily expanding, but there is disagreement about the dominance of Chinese academics (**Wagner** *et al.*, 2022). In recent years, there has been much discussion about whether China's academic development is of high quality. **Wagner** *et al.* (2022) examined the top 1% of highly cited publications and discovered that the top 1% of China's cited articles surpassed those of all other countries after 2019. Despite this abundance, the extent of China's scientific output remains debatable. **Yang** and **Liu** (2021) contended that China is an autocratic state, that increasing the number of researchers will not necessarily improve research quality, and that democracy and academic freedom will lead to higher citation rates and other forms of academic creativity. Analysis of highly cited publications has been used on numerous occasions to assess a country's scientific impact. By studying highly cited scholars, we can evaluate the structure of scientific talent in a country from the perspective of scholarly knowledge structures.

In 2020, the *State Council of China* designated interdisciplinary fields as accessible degrees. To support IDR projects, the *National Natural Science Foundation of China* established the *Department of IDR* (**Zhang**; **Leydesdorff**, 2021; *National Natural Science Foundation of China*, 2020). This represents a shift in the structure of talent development in China, with interdisciplinary development becoming a national priority. The divisions in the IDR domain pose a complex problem (**MacLeod**, 2018), with such studies typically being thorough in two or more areas (**Cunningham** *et al.*, 2022). Interdisciplinary studies have a greater impact and visibility than single-field studies. **Chen** *et al.* (2015) discovered that publications with a high number of citations are more interdisciplinary than papers with a low number of citations, and this phenomenon occurred in 90% of scientific fields.

IDR frequently encounters new challenges and risks (**Bridle**, 2018; **Yegros-Yegros** *et al.*, 2015). It may receive less support and attention than general studies (**Bridle**, 2018). IDR typically necessitates a combination of different skills, and researchers early in their careers frequently face additional challenges and risks because of the difficulty in gaining recognition. However, highly cited scholars are known to the general public and have greater influence than average researchers. The distribution of research funding is unequal (**Benz**; **Rossier**, 2022). These highly cited scholars frequently have an advantage in terms of study time, performance evaluation, funding sources, and other issues in IDR. Consequently, IDR by highly cited scholars frequently represents the actual interdisciplinary development of their subjects and fields. Early researchers focused on the development of interdisciplinary knowledge in various fields (as well as the networks among authors) when studying interdisciplinary phenomena (**Liu** *et al.*, 2011; **Yang** *et al.*, 2010; **Aboelela** *et al.*, 2007). With its growing influence, IDR has received increasing attention. In recent years, there has been increased interest in research on the psychology of interdisciplinary scholars, on how to cultivate them, and on how to solve problems they encounter early in their careers (**Bridle**, 2018; **Paton** *et al.*, 2019; **Katoh** *et al.*, 2021). Although some scholars have discovered that highly cited papers have higher interdisciplinary characteristics (**Chen** *et al.*, 2015), there have been few studies on highly cited scholars. In particular, China has developed national policies and systems to foster interdisciplinary talent and promote IDR (**Sun**; **Cao**, 2020). Therefore, there is an urgent need to investigate the interdisciplinary status of influential scholars in China.

> By studying the interdisciplinary status of highly cited scholars in a region, researchers can grasp the region's overall scientific research and development trends and motivations in various fields

3. Research questions

RQ1. In which fields are China's highly cited researchers distributed?

RQ2. What is China's interdisciplinary knowledge network? In other words, to what extent are highly cited Chinese researchers interdisciplinary?

RQ3. Are there differences in the number of highly cited scholars and the relationships between disciplines in different types of organizations?

4. Research methodology

4.1. Data

This study used data from the top 2% of the world's highly cited researchers (**Baas** *et al.*, 2020). The data of highly cited Chinese researchers were extracted; of the 5,272 highly cited Chinese scholars, 4,084 worked at a university. Out of 708 organizations, 424 were universities. A total of 18 fields and 145 subfields were identified.

4.2. Network analysis

Network analysis is a method that can quantify the structural characteristics of nodes and links in a network, and then analyze and mine the relationships among people, organizations, and topics that constitute the network (**Park** *et al.*, 2019a; **Zhu**; **Park**, 2020). Network analysis is widely used in scientific research. Specifically, **Zhu** and **Zhang** (2020) explained the relationship between words using network path calculation, network density, centrality, cluster analysis, and other indicators. **Wang** *et al.* (2021) analyzed network density, centrality, and other indicators of cooperative and citation networks, finding that doctoral thesis supervisors in physics had limited influence on doctoral positions. **Yoon** and **Park** (2020) used semantic networks to analyze knowledge works in North Korea and found that national scientific and technological development promoted high-tech research, with energy, agriculture, and mining production studies as hot spots.

In this study, network analysis methods were used to analyze the domains of highly cited Chinese researchers in detail. We adopted two network analysis methods: one-mode network analysis and two-mode analysis. In a modular network, nodes represent research domains, and links represent the connections between domains. If a researcher has two areas of study, the two areas are considered related. In the two-mode network, nodes represent the classification of the research field and research organization, and links represent the relationship between the research organization and the research field. If a researcher has two areas of study, both areas are related to the research organization to which the researcher belongs.

In this study, centrality, link analysis, and density indices were used to analyze a network, which can evaluate the influence of nodes in the network and the structural attributes of the network. The centrality index usually includes degree, betweenness centrality, closeness centrality, and eigenvector centrality (**Yoon** *et al.*, 2017; **Zhu**; **Park**, 2021). Degree refers to the total number of nodes directly connected to a node; betweenness centrality is the intermediary role of a node, while closeness centrality is the distance of the node to other nodes, and eigenvector centrality measures the indirect influence of nodes (**Zhu**; **Park**, 2021). A connection analysis index helps in studying the relationship structure of the network, and not only reflects the influence of nodes but also analyzes the connection attributes between nodes (**Park**; **Thelwall**, 2008). A density index can evaluate the structural characteristics of the entire network (**Zhu** *et al.*, 2021). This study used *UCINET 6* and *NodeXL* software to build the matrix and conduct network analysis, QAP analysis, and visualization.

5. Cluster analysis

Cluster analysis classifies objects into different groups (**Abdullah** *et al.*, 2021; **Mansano** *et al.*, 2021; **De-Luca**, 2021). **Singh** *et al.* (2020) described the knowledge structure of enterprise universities through cluster analysis. **Lamirel** *et al.* (2020) used cluster analysis to determine a 40-year structure of Chinese scientific knowledge. In this study, the Clauset-Newman-Moore algorithm was used for classification, which finds the group that leads to the greatest growth (**Clauset** *et al.*, 2004; **Park** *et al.*, 2019b). Thus, two groups were found, and the maximum modularity value, which represents the similarity between the two groups, was obtained by combining them. Each node was associated with a group, and the group with the highest modular structure was generated after multiple calculations. This process divided a network into groups.

5.1. QAP analysis

The quadratic assignment procedure (QAP) is an algorithm used to test the correlation between networks, comparing the structural similarity between matrices (**Seok** *et al.*, 2021; **Uddin** *et al.*, 2019). It is an analysis method often used by network researchers (**Park** *et al.*, 2016). **Ju** and **Sohn** (2015) used the QAP method to compare patent networks of different offices. **Barnett** *et al.* (2014) used QAP analysis to reveal significant correlations between coauthored networks and university URL citation networks. In this study, we compared the research domain matrices of five different attribute organizations. First, Pearson correlation coefficients between the nodes of the corresponding research domains in each matrix were measured. The rows and columns in the study domain matrix were then randomly arranged, and the correlations of these nodes were calculated. Subsequently, several iterations were carried out to obtain a result. Generally, a significance level below 0.05 indicates a strong correlation. In this study, a significance level below 0.001 was used to ensure more rigorous results.

6. Block modeling

The block model is used to examine the connection structure of different types of research organizations. Block modeling can divide participants into different modules according to certain criteria based on their attributes (**Choe**; **Lee**, 2017). Previously, **Park** and **Thelwall** (2006) had used regions as standards to divide blocks and analyze network science communication. **Choi** *et al.* (2015) analyzed international cooperation in scientific research by dividing countries based on regions and languages.

Universities in China have many engineering majors, but science and technology universities have several humanities and social science majors. Government support and regional support in China vary greatly depending on the level and/or type of university. For example, according to the 2016–2019 report by the *National Office for Philosophy and Social Science*, there were more than 500 non-Double First-Class universities with fewer foundation projects than the 137 World First-Class universities and First-Class Academic Discipline Construction universities (*National Office for Philosophy and Social Science*, 2021). While universities in other countries might not do this, the allocation of research resources among Chinese universities varies so much that it would be more appropriate to divide them by grade rather than organizational attributes.

In this study, we created five blocks. Block modeling can divide scholars' units into discrete clusters based on each unique block defined by the researcher. Establishing World First-Class universities and inculcating First-Class Academic Discipline Construction universities is part of the national education policies promulgated by the Chinese government in 2017. The aim is to promote the development of Chinese universities. The proportion of national research funds allocated to various types of universities differed. Universities that are not Double First-Class often lack support from the state. Therefore, in this study, we divided organizations into the following five blocks: World First-Class universities, First-Class Academic Discipline Construction universities, non-university organizations, non-Double First-Class universities, and universities not from Mainland China.

7. Research results

RQ1. In which fields are China's highly cited researchers distributed?

A profile analysis of researchers was conducted in terms of affiliated universities and academic disciplines. Figure 1 shows that enabling and strategic technologies are the most popular field among highly cited Chinese researchers, followed by engineering, chemistry, and information and communication technologies. Social sciences, historical studies, and a few other fields, however, accounted for only a small proportion of highly cited Chinese researchers.

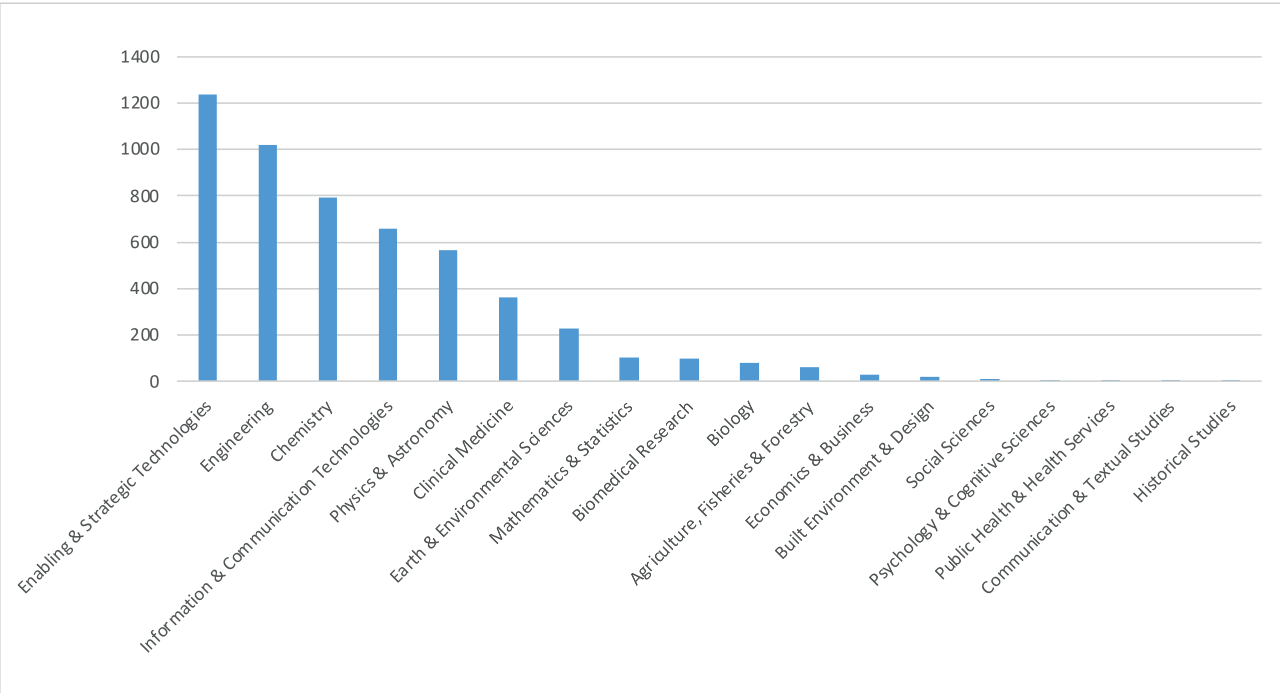

Figure 1. Fields of highly cited Chinese researchers

RQ2. What is the interdisciplinary knowledge network of China? In other words, to what extent are highly cited Chinese researchers interdisciplinary?

To answer the second question, after sorting, 145 subfields were obtained. If a researcher in two fields was observed, the two fields were considered interconnected. In other words, nodes are subfields, and links are the number of researchers shared among different sets of two fields.

In Table 1, we calculated the centrality of each node. A centrality index between 0 and 100 was obtained by standardizing the results.

Table 1. Centrality of nodes (Top 20)

Rank	Subfields	Degree	Betweenness centrality	Closeness centrality	Eigenvector centrality
1	Artificial Intelligence & Image Processing	100.00	100.00	98.89	91.33
2	Materials	97.92	52.14	100.00	100.00
3	Networking & Telecommunications	89.58	47.53	96.41	86.87
4	Energy	85.42	72.25	98.54	91.80
5	Oncology & Carcinogenesis	81.25	88.08	97.11	68.50
6	Mechanical Engineering & Transport	75.00	26.36	90.90	78.27
7	Environmental Sciences	72.92	51.88	90.28	69.62
8	Analytical Chemistry	68.75	17.84	93.09	79.55
9	Applied Physics	66.67	32.35	92.47	79.36
10	Neurology & Neurosurgery	64.58	74.27	94.06	62.71
11	Biochemistry & Molecular Biology	64.58	42.52	87.10	48.50
12	Industrial Engineering & Automation	60.42	42.14	91.82	62.28
13	Plant Biology & Botany	56.25	48.52	90.60	50.05
14	Nanoscience & Nanotechnology	54.17	21.77	88.53	65.34
15	Optoelectronics & Photonics	52.08	7.20	84.64	62.89
16	Polymers	52.08	7.56	82.32	61.65
17	Chemical Engineering	50.00	4.61	87.10	64.23
18	Chemical Physics	50.00	6.94	84.91	62.99
19	Pharmacology & Pharmacy	50.00	19.12	86.80	56.14
20	Organic Chemistry	47.92	6.28	83.07	57.23

On examining betweenness centrality, the field with the highest betweenness was artificial intelligence and image processing, followed by oncology and carcinogenesis, then neurology and neurosurgery. For eigenvector centrality, the field with the highest value was materials, followed by energy, then artificial intelligence and image processing. Artificial intelligence and image processing had the most links and the largest intermediary status. Materials had the shortest route to other fields, and fields directly related to materials had a higher average status.

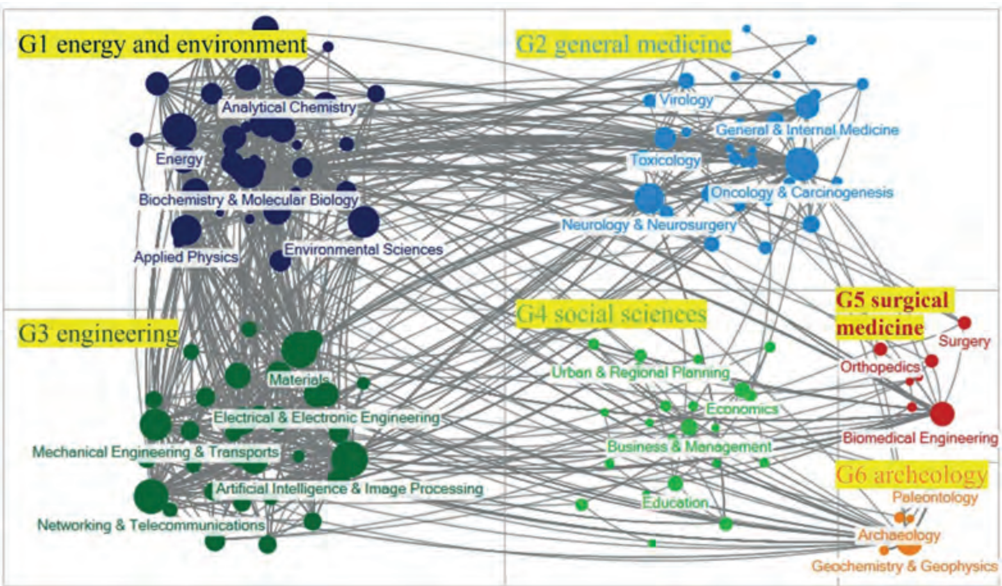

Figure 2. Subfield networks of highly cited Chinese researchers

After clustering the interdisciplinary network, six categories were generated. The largest category, as shown in Figure 2, was energy and environment, followed by general medicine, then engineering. Surgical medicine was separate from general medicine. Archeology was separate from social sciences. These findings suggest that IDR in archeology and surgery is relatively active. Cluster analysis found that the average geodesic distance was the highest in social sciences, followed by general medicine plus energy and environment. These three fields have a wider range of IDR.

> The field with the highest betweenness was artificial intelligence and image processing, followed by oncology and carcinogenesis, then neurology and neurosurgery

We used link and density analyses to examine the six groups further. Table 2 shows the link and density analysis indicators of the internal structures of the six groups. Figure 3 is a link-relationship network diagram of the various groups.

Table 2. Link analysis and density analysis indicators for the internal structures of the six groups

Group	Cluster name	Nodes	Links	Diameter	Average geodesic distance	Graph density
G1	Energy and environment	38	1,577	4	1.93	0.25
G2	General medicine	35	123	6	2.54	0.12
G3	Engineering	35	1,719	3	1.67	0.31
G4	Social sciences	25	33	8	3.76	0.08
G5	Surgical medicine	7	7	4	1.92	0.33
G6	Archeology	5	61	3	1.36	0.50

According to the results of the network analysis, engineering had the highest number of internal links (1,719), followed by energy and environment (1,577). Interestingly, we found that groups with many nodes do not necessarily have many links. For example, the general medicine group had 35 nodes but only 123 links. In addition, the surgical medicine group had seven nodes and seven links. At five nodes, archeology is the smallest group, but its 61 links is more than social sciences at 33. The largest diameter and highest average geodesic distance within a group were for social sciences, which also had the greatest span. The highest graph density within a group was for archeology (0.50), indicating close cooperation between the various fields within the group. The social sciences group had the lowest density (0.08), and thus, cooperation among the various fields within the group was relatively low.

As shown in Figure 3, G1 and G3 had the closest relationship at 1,280 links. Next, G1 and G2 had 166 links. G1, G2, and G3 had links with other groups, whereas G4 and G5 had no links with G6. The interspecialty of archeology focuses on engineering, energy and environment, and general medicine. Although research in the field of archeology has the appearance of interdisciplinarity, it may be difficult to conduct cross-disciplinary research with social sciences and surgery.

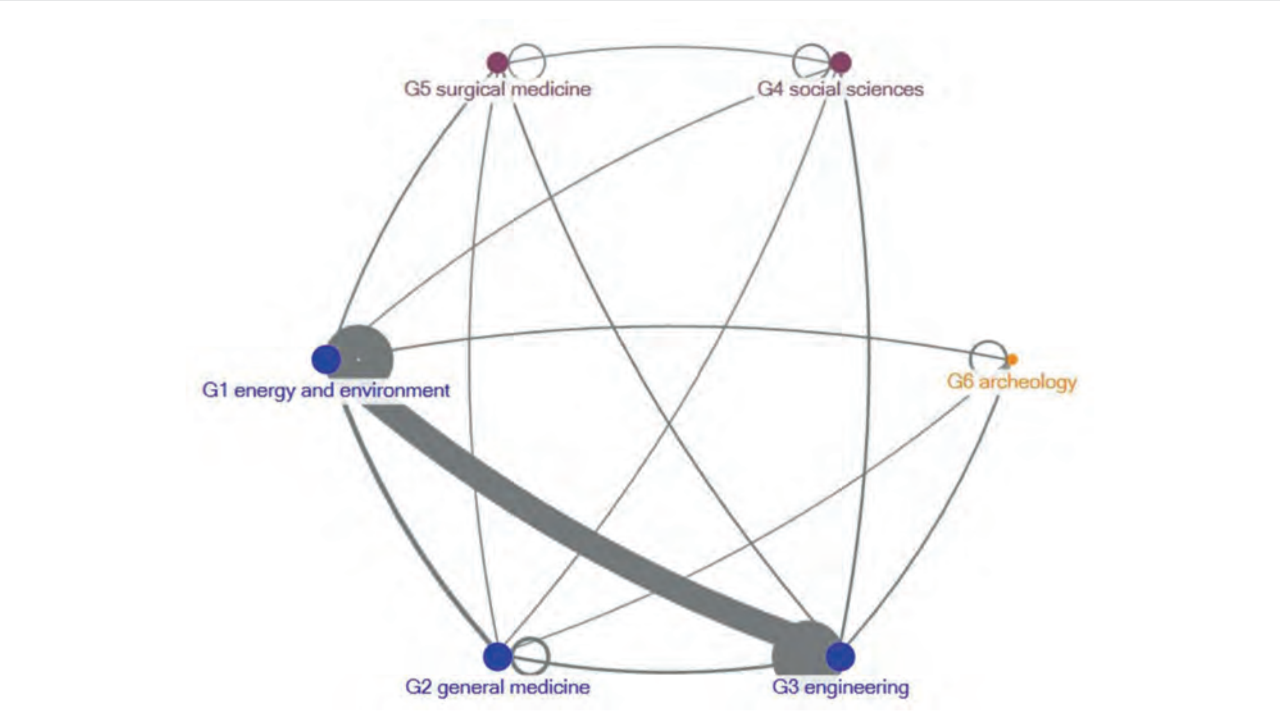

Figure 3. Network of link relationships among the groups

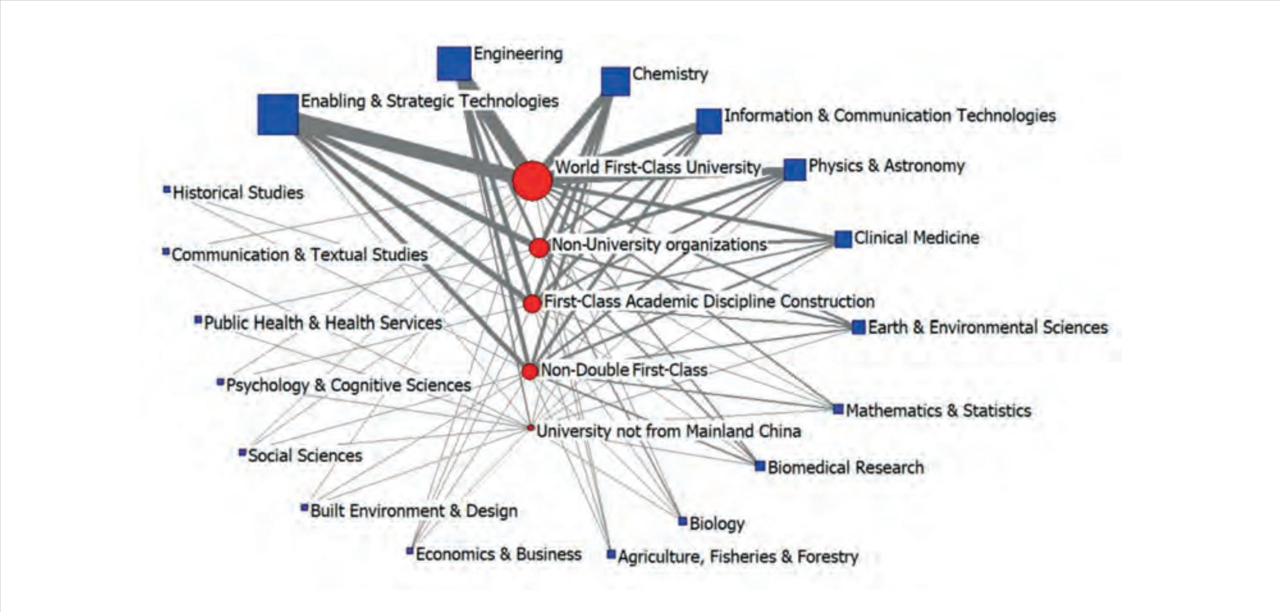

Figure 4. Network of organizational types and research fields

RQ3. Are there differences in the number of highly cited scholars and the relationships between disciplines in different types of organizations?

According to the results of the analysis, there are 80 disciplines and research institutes in 42 World First-Class universities, 74 in First-Class Academic Discipline Construction universities, 240 in non-Double First-Class universities, 30 in non-Mainland-China universities, and 284 in non-school organizations. We counted all authors' organizational attributes and research fields and created matrices for them. Network diagrams of organizational properties and research fields are in Figure 4.

The red nodes in Figure 4 represent organizations with five properties, and the size indicates the number of scholars from organizations in that category (the more scholars, the larger the node). Similarly, the size of a blue node indicates the number of scholars in the field. We found 2,442 scholars from World First-Class universities, accounting for 46.3% of the total, which is far higher than other categories. The second largest group was non-university organizations with 1,052 scholars (20.0%). The third largest category was First-Class Discipline Construction universities with 862 scholars (16.4%). The fourth largest category was non-Double First-Class universities with 828 scholars (15.7%). Finally, non-Mainland-China universities accounted for 88 scholars (1.7%).

The thicker the link in the figure, the more scholars such organizations have in the field, and the higher the strength of the relationship between the organization and the field. We found that enabling and strategic technologies performed best in the World First-Class University category, followed by engineering and then chemistry. The top three in the First-Class Discipline Construction University category were the same as in World First-Class universities. Enabling and strategic technologies continued to perform the best among non-school organizations, followed by chemistry, physics, and astronomy. Among non-Double First-Class universities, engineering and strategic technologies ranked highest followed by engineering then information and communication technologies. Among non-Mainland China universities, engineering ranked highest followed by enabling and strategic technologies then information and communication technologies.

To further analyze whether there is a statistical difference in the network of talent distribution for different fields in five types of organizations, we constructed a two-mode relational network matrix of those categories. The one-mode relational matrices of the domains were derived according to their connections. We conducted QAP analysis on the domain relation matrix of the five categories and obtained the results in Table 3.

Table 3. QAP correlations for five categories

	University not from Mainland China	Non-university organization	Non-Double First-Class University	First-Class Academic Discipline Construction University
World First-Class University	0.944318*	0.844537*	0.956538*	0.980226*
University not from Mainland China		0.730437*	0.909001*	0.911998*
Non-university organization			0.850232*	0.860228*
Non-Double First-Class University				0.940389*

*Significant at p<0.001

The analysis results show that the domain network between World First-Class universities and First-Class Academic Discipline Construction universities was the most similar, reaching 98.0%, followed by networks between World First-Class universities and non-Double First-Class universities. Performance differed most between non-Mainland-China universities and non-university organizations. Third was the relationship network between World First-Class universities and non-university organizations. In addition, the relationship network similarity between non-university organizations and all other categories was less than 90%, which is worse than for other categories. This shows that senior scholars from World First-Class universities and World First-Class Academic Discipline Construction universities are similar in their fields. Non-university organizations and university organizations had relatively different field relations.

> Social sciences, historical studies, and a few other fields accounted for only a small proportion of highly cited Chinese researchers

8. Discussion and conclusion

In this study, network analysis methods were used to investigate Chinese researchers ranked in the top 2% of the world's most highly cited researchers. It was found that enabling and strategic technologies, engineering, chemistry, plus information and communication technologies accounted for a large proportion of highly cited Chinese researchers, while the social sciences, historical studies, and a few other fields accounted for only a small proportion. This discrepancy among fields may have been exacerbated by the Chinese government's increased emphasis on science and engineering. According to **Xu** *et al.* (2015), funding for the social sciences in China is significantly lower than funding for the natural sciences, and the proportion of funding for the top 1% of social science articles from China that have been cited was not high and significantly lower than funding in other countries with a high article output. In terms of funding, the benefits from highly cited social science scholars in China are unclear. Changes in funding policies may improve social science research. The subfields of artificial intelligence and image processing, oncology and carcinogenesis, and neurology and neurosurgery had higher betweenness centrality. These fields serve as bridges across disciplines. Artificial intelligence and image processing techniques are increasingly used as tools to connect disparate disciplines. Artificial intelligence, according to **Liu** *et al.* (2020), caused knowledge spillover and promoted technological innovation in China. In the medical research field in China, the biology-psychology-society medical model was developed to replace the biomedical model of single-treatment research (**Song** *et al.*, 2010). Additionally, the subfields of materials, energy, and artificial intelligence and image processing had higher eigenvector centrality, compared to other subfields. A deeper analysis of hidden interdisciplinary fields was also conducted. Subdomain interdisciplinary networks were clustered into six groups. It is interesting to note that while the social sciences did not have a high number of highly cited Chinese researchers, it had the widest range of IDR activities. The frequency and breadth of social scientists' involvement in important research is increasing as data and computing power grow and as diverse teams are increasingly needed to solve complex problems (**Buyalskaya** *et al.*, 2021). The numbers of highly cited Chinese researchers and interdisciplinary indicators were higher for general medicine as well as energy and environment. The importance of IDR is universally acknowledged (**Yang** *et al.*, 2010), and expanding the extent and depth of IDR is conducive to the development of science. In addition, among highly cited scholars in China, the social sciences had the largest interdisciplinary range, but cooperation within the social sciences group was low. The closest cooperation occurred between subfields within archeology. Other interdisciplinary disciplines for archeology were engineering, energy and environment, and medicine.

China is one of four ancient civilizations with numerous sites and cultural relics. Owing to technical and preservation issues, archeology-related research has a long cycle and necessitates collaboration among scholars from various disciplines (**Wu** *et al.*, 2019; **Gu** *et al.*, 2013). For example, the study of metallurgy must be combined with engineering technology, and the study of remains cannot be separated from medical knowledge. Furthermore, professional knowledge of energy and radiation, chemistry, environmental science, geography, climatology, history, etc., is required in most archeological studies (**Li** *et al.*, 2020; **Yu** *et al.*, 2012; **Jiang** *et al.*, 2017; **Li** *et al.*, 2010; **Deng** *et al.*, 2013; **Chen**; **Gideon**, 2014).

There were great differences in the number of organizations in various categories. Although there are 42 World First-Class universities, they accounted for almost half of the top 2% scholars from China. The distribution of top scholars from China follows Pareto's law. Double First-Class universities accounted for 62.7% of high-level scholars, and there were significant differences in the distributions of scholars. Double First-Class universities are usually well-funded and enjoy high national and regional status, whereas many general universities in central and western China often lag World First-Class universities in terms of salary, treatment, and scientific research funding. The annual research expenditure of some World First-Class universities is ten times that of ordinary universities. For China, most universities are state-owned, which is usually an indicator of state-allocated funding, and they have little market competition. The majority of research funding comes from governments (**Jung**; **Seo**, 2022). However, these huge differences restrict the development of general colleges and universities. Human resources, research,

> The frequency and breadth of social scientists' involvement in important research is increasing as data and computing power grow and as diverse teams are increasingly needed to solve complex problems

material collections, data preservation, etc., can all be covered by research funding. If the government would provide relatively large subsidies to highly cited scholars from ordinary universities, it could be beneficial for retention of those scholars. Hence, knowledge spillover to general universities from highly cited scholars would be generated, and the sustainable development of general universities in scientific research will be promoted.

> Materials, energy, and artificial intelligence and image processing had higher eigenvector centrality, compared to other subfields

In addition, from the results of block model analysis, each block had its own characteristics. Studies of highly cited scholars from World First-Class universities and universities with first-class disciplines were the most similar. However, in terms of research topics, there were some differences between university scholars and non-university scholars, such as those in government agencies and enterprise research institutions. It is suggested that the government can promote a triple-helix effect in government enterprises and schools so that organizations of different natures can produce synergistic effects (**Choi** *et al.*, 2021). In university-industry-government collaborations, cooperation between two organizations can affect cooperation from the third (**Leydesdorff**; **Park**, 2014; **Park**; **Stek**, 2022). To achieve better cooperation, three-fold cooperation must be studied and macro-controlled. Because system dynamics constantly change, the endogeneity of change and innovation generates momentum, and as the system develops, selection and control become necessary components (**Leydesdorff**; **Smith**, 2022). Interdisciplinary development before 2020 can be viewed as endogenous change and innovation, whereas after 2021, under state regulation, interdisciplinary development has produced choice and control. In the next stage, research based on the triple-helix effect will be used to better regulate China's interdisciplinary system.

This study analyzed the interdisciplinary characteristics of highly cited Chinese scholars, discovered disequilibrium in fields and organizations to which they belong, and offered reasonable suggestions. China began interdisciplinary development at the national level in 2020, and our research can serve as a foundation for the development of China's future interdisciplinary references. Furthermore, this study can be used as a reference for interdisciplinary policies in other countries. Recently, many scholars have explored gender differences in research topics and their influence. In future research, classification by gender will be considered, and information of more value will be extracted from analyzing gender differences.

> It is suggested that the government can promote a triple-helix effect in government enterprises and schools so that organizations of different natures can produce synergistic effects. In university-industry-government collaborations, cooperation between two organizations can affect cooperation from the third

9. Declarations

The authors have no financial or non-financial conflicts of interest to disclose.

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The *Social Systems Citation Theory* (*SSCT*): A proposal to use the social systems theory for conceptualizing publications and their citation links

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Abstract

The normative theory of citing considers citations as rewarding tools to acknowledge the influence of scientific works, while the social constructivist theory of citing considers citations, for example, as persuasion tools used by authors to support their claims, and convince the scientific community that those claims are valid. Other citation theories and models have been proposed in recent years to overcome the limitations of the normative and social constructivist theories. Nevertheless, they have not been able to fully explain all citation motives of scientists (but have a certain focus). This study proposes a new theory (which we call "social systems citation theory", SSCT) that integrates previous theories and models on publications and their citation links and is mainly based on Niklas Luhmann's "social systems theory". Luhmann's social systems theory focuses on "communications" as the basic constituting elements of a social science system and not on humans and their motives. Humans are not part of social systems but are connected with them and irritate them. Thus, the social systems theory does not have the problem of integrating various and different motives of humans to cite in the science system. In the SSCT, authors' motives to cite belong to psychic systems while publications and their citation links belong to the social science system. The systems operate autonomously but interact with each other: the social system operates recursively with publications and citation links. Although psychic systems stimulate or irritate the science system, they do not determine communications in the science system. In this study, we explain the SSCT and demonstrate how the theory can be used to underlie empirical bibliometric studies.

Keywords

Autopoiesis; Communication; Niklas Luhmann; Publications; Citations; Citation theory; Social systems citation theory (SSCT).

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1. Introduction

Since the 1960s, with the introduction of the *Science Citation Index* by Eugene Garfield, citation analyses have increasingly become an (important) method in science of science studies. Researchers who used the data for the measurement of science also started to think about a possible theory of citation (**Leydesdorff**, 1998). The relationship between citation counts and the quality of scientific contributions has been a central question in studying scholars citing behaviour and developing possible citation theories (**Bornmann**; **Haunschild**, 2017). Two theories that can be denoted as traditional citation theories were proposed very early in this process of thinking about theorizing of citations. These two traditional citation theories in bibliometrics are the "normative" theory and "social constructivist" theory.

The normative theory, proposed by Robert K. Merton in the 1940s, focuses on the quality and influence of scientific works, proposing that citations are given based on scientific merit and reflect the impact of cited works on citing works. In the normative theory, citations are rewarding tools to acknowledge and credit the cited work for its influence on and contribution to the citing work (**Van-Raan**, 1998).

The social constructivist theory on citations can be traced back to **Berger** and **Luckmann** (1966) who proposed that social contexts define a specific stock of knowledge which predefines reality (see here **Dahler-Larsen**, 2012). The social constructivist citation theory focuses on social factors (strategic and rhetorical reasons) rather than the quality and contribution of the scientific work: citing is fundamentally a social process (**Aksnes**; **Langfeldt**; **Wouters**, 2019). According to this theory, for example, citations serve as persuasion means. In searching certain papers for citing, authors look for evidence to support their scientific claims to convince the scientific community that those claims are valid. Nigel Gilbert, a British sociologist, was one of the pioneer researchers who, in the 1970s, noted that citing is a form of persuasion (**Mcinnis**; **Symes**, 1988).

Evaluative bibliometrics aims to evaluate and rank papers, journals, scholars, institutions, and countries. **Moed** (2009) describes evaluative bibliometrics as a discipline that constructs and develops quantitative indicators for evaluating the performance of research. **Moed** (2009) explains that one of the main methodologies used in evaluative bibliometrics is citation analysis that investigates the impact, influence, or quality of scholarly works. The main assumption of evaluative bibliometrics is that authors only cite the scientific works that have cognitively influenced them (**Bornmann**; **Haunschild**, 2017). If the assumptions of the normative theory are valid, citation analysis can be used to identify the usefulness of scientific works for scholars. However, the validity of citation analysis for measuring scientific impact is challenged by scholars who support the social constructivist view that states authors have various citation motives which are independent of the usefulness and quality of the cited work (**Liu**, 1993b). For example, in the constructivist view, citations may be influenced by citing authors' mental states and emotions (**Riviera**, 2013). Thus, evaluative bibliometrics should be used with caution (or not at all) due to its limitations. The complex nature of citation motives and citation decision processes have been explained in detail by some previous studies; an overview of these studies can be found in **Tahamtan** and **Bornmann** (2018a).

Most empirical studies in evaluative bibliometrics have relied upon the normative and social constructivist theories to explain citation motives and decisions. Since both theories are basically contradictory and have specific limitations, some researchers have attempted to propose other theories and models of citations (that integrates both perspectives on citations). For example, **Nicolaisen** (2007) proposed that citing is an honest activity because authors tend to avoid peer criticism for dishonest citing.

Regardless of all the attempts made in this area, previous theories and models have not yet been able to provide a comprehensive theoretical framework. Therefore, the current study aims to introduce a theory on publications and their citation links that is based on the "social systems theory" of Niklas **Luhmann** (2012a; 2012b), a German sociologist mainly active in the 20th century. The new social systems citation theory (SSCT) integrates previous citation theories and does not have their limitations. What makes the social systems theory suitable for developing a citation theory is that it focusses on "communications" and not on humans and their motives as the basic constituting elements of a social system. With this focus, the SSCT does not have the problem of integrating various and very different citation motives of authors. In the SSCT, publications and citations can be seen as elements in the (formal) science communication network that can be observed and empirically studied independently from the publishing and citing authors (who are as psychic systems in the environment of the social science system).

2. Traditional theories on citations

Section 2 explains the citation theories proposed in the past. This section explains, first, the dominant normative and social constructivist theories on citations. Then, some other citation theories and models are described that have attempted to overcome the limitations of the normative and social constructivist citation theories.

2.1. Normative theory (on citations)

In sociology, normative refers to "norms" or "shared values" that specify what is right and desirable and what is wrong or undesirable. The norms or values encourage the desirable activities that ought to occur. The norms of science were defined by **Merton** (1968b), and include communism, universalism, disinterestedness, and organized skepticism. The four norms constitute the ethos of science.

- Communism refers to the fact that scientists know that their works depend on their predecessors and therefore scientific findings are the product of social collaborations between scientists working on similar topics (**Merton**, 1973). By citing the works of predecessors that are proved to be of value, scientists generate topic-specific networks with social links that are expressed as citations (**Nicolaisen**, 2007).
- Universalism points to the fact that the decisions about the validity of scientific claims, and what to cite, are not influenced by personal attributes of the claim maker (**Turner**, 2007) such as race, nationality, or rank, and political or religious views (**Nicolaisen**, 2007).
- Disinterestedness assumes that scientists use rigorous policing in their scientific activities (**Merton**, 1973) and are not interested to gain personal advantage by, for instance, citing their own works (**Nicolaisen**, 2007).
- The final norm is organized skepticism which requires (in the process of citing) that scientists remain skeptical of their own works as they do with the works of others (**Macfarlane**; **Cheng**, 2008; **Nicolaisen**, 2007).

The normative theory of **Merton** (1968b) links citations to the impact, usefulness, and quality of scientific works (**Aksnes**; **Langfeldt**; **Wouters**, 2019), because the theory claims that scientists usually follow the norms in the ethos of science. In the normative theory, citations represent quality, importance, and significance (**Small**; **Boyack**; **Klavans**, 2019; **Teplitskiy** *et al.*, 2018). Giving credit to other scholars' works may reflect that authors are acting against their self-interest in gaining recognition themselves (**Case**; **Higgins**, 2000). However, citations are a means for social recognition (**Merton**, 1968a) or colleague recognition (**Cozzens**, 1989).

> The validity of citation analysis for measuring scientific impact is challenged by scholars who support the social constructivist view that states authors have various citation motives which are independent of the usefulness and quality of the cited work

Many empirical studies have supported and indicated that the normative view on citations is valid (an overview of these studies can be found in **Bornmann** and **Daniel**, 2008). However, **Judge** *et al.* (2007) maintained that the characteristics of universalism, particularism, and mixed universalism-particularism all impact the extent to which articles receive citations.

2.2. Social constructivist (citation) theory

In the social constructivist view, citations are not motivated by quality, but rather the ability of the cited work to support the validity of the citing author's claims (**Small**; **Boyack**; **Klavans**, 2019). In the social constructivist view, citations signal motivations for citing other than quality or relevance, such as gaining credibility (**Teplitskiy** *et al.*, 2018). For instance, the reason for citing well-known scholars can be gaining credibility rather than due to the quality or relevance of the cited work. In bibliometrics, this is known as persuasion by name-dropping (**Frandsen**; **Nicolaisen**, 2017) where authors cite the works by well-known scholars to gain credibility (**White**, 2004). Many previous studies have discussed the persuasion nature of citations (**Janke**, 1967) that the main purpose of citing is not to acknowledge previous scholars, but to reach scientific, political, and personal goals (**Liu**, 1993a). Scholars like **Barnes** and **Dolby** (1970) were among the pioneers who had a constructivist approach to citations (**Wyatt** *et al.*, 2017).

Latour (1987) emphasizes "that the primary goal of writing is to persuade the reader of one's argument" (**Davis**, 2009, p. 9), and citing is an important element in scientific writing that can be well used strategically. **Klamer** and **Van-Dalen** (2002) mentioned that citations are used to persuade each other of the merit of scientific works. **Cole** (1992) –an early sociologist of science using citation data– pointed to the importance of both author characteristics and social processes in authors' citation decisions, while he also believed in the importance of a paper's content on its use and citation. **Teplitskiy** *et al.* (2018) indicated that most citation decisions are following the social constructivist theory. Their empirical results showed that over 60% of authors believed the references they had cited had "minor" or "very minor" impact in their research. **Teplitskiy** *et al.* (2018) also indicated that citation counts influenced the authors' perception of the "quality", "influence", and "significance" of the scientific works. In other words, scholars may cite the works they are not influenced by with respect to the direction of research and quality of results. The interviews conducted by **Tahamtan** and **Bornmann** (2018b) also indicated that cited references had minimal impact on the creative ideas mentioned in breakthrough papers.

The social constructivist view on citations seems to have been rooted in **Berger** and **Luckmann** (1966) who

> "emphasize that the normative order –the world of norms taken for granted– constitutes perhaps the most foundational and constitutive layer of reality. In contrast to scientific and rationalistic conceptions of knowledge, the sociological view of knowledge does not seek to be based on given principles of truth or validity; instead it demonstrates that whatever is taken to be true, or valid, or useful, or effective in a given context depends on how social acceptability, legitimation, and a taken-for-granted institutional order are fabricated through social construction" (**Dahler-Larsen**, 2012, p. 22).

> This study proposes a new theory that integrates previous theories and models on citations and is mainly based on Luhmann's "social systems theory"

2.3. Citations as markers or symbols

Small (1978) states that little attention has been paid to the "content of citation context" in previous studies and theories, and that they have missed the role of citations as symbols of concepts, methods, or theories. According to **Small** (1978), a citation is a symbol for both the physical document itself and for the concept or idea mentioned in the document. Any statement describing a citied work, such as statements from the findings or methodology, or a theoretical statement are called "ideas", and the cited work is a "symbol" representing that idea (**Small**, 1978). The idea that is cited, is an "imperfect 'copy of an original' which resides inside in the mind of an individual" (**Small**, 1978, p. 329). Each paper can be a symbol of values for an idea. For instance, a paper can be a symbolic value of a method for protein determination. The ideas cited in the citing work are the results of selection processes by the citing author (**Small**, 1978).

> In the social constructivist view, citations are not motivated by quality, but rather the ability of the cited work to support the validity of the citing author's claims

Sometimes a "uniformity of usage" of ideas can be seen, particularly in highly-cited papers, where most citing authors use a unique idea in the citing work. Highly-cited documents may have standard usage and meaning for citing authors (**Small**, 1978). "In some cases, the association between idea and document is well established by uniform practice within the community" (**Small**, 1978, p. 337) so that it creates a standard symbol. However, if an association between an idea and a document is made for the first time, such a connection remains in the realm of non-symbols (**Small**, 1978).

2.4. Reflexive indicator theory

Wouters (1998; 1999) proposes a reflexive citation theory, where references and citations are considered two different things. Each reference is a representation of the cited text that consists of characteristics of the main body, as well as author name, title, journal, year of publication, volume and issue of publication, and page numbers. The citation is a different format than the reference in **Wouters** (1998; 1999): the citation is an inversion of the reference. He mentions that citation analysis is depended on the counting of the number of inverted references (citations) in the citing text. Therefore, whenever we count the number of times a work has been cited, we are inverting references to citations (**Wouters**, 1998). **Wouters** (1998, p. 233) states that in the reflexive indicator approach, we deal thus with two operations:

> "the giving of reference is one operation. The making of citation is a second one, reflexive towards the first as well as contingent on it".

Wouters (1998) believes that the birthplace of citations is not the scientist's desk, but it is citation indexes such as the *Science Citation Index* that consist of references that have been included in scientific papers. He mentions that in citation indexes, references are transformed to citations as the end product; and this end product is the result of the indexing process and not the act of citing a document. In other words, if an author cites a work, "she does not 'give a citation'" (**Wouters**, 1998, p. 234). Therefore, citations in the index are equal, yet "references are not equal: they have different functions in the citing text, and their underlying motives are various" (**Wouters**, 1998, p. 235).

Wouters (1998; 1999) believes that the main issue with current citation theories is that they have not differentiated citations from references. In his view, most past citation theories, namely the normative and social constructivist theories, have tried to explain citation patterns based on the citing behaviour of scientists. These theories attribute meaning to citations (e.g., citations represent recognition or persuasion), while citations are all equal, and are meaningless and dimensionless, unlike references that have very different characteristics (**Wouters**, 1999). Therefore, a citation theory based on scientists' citing behaviour and citations is not promising because of

> "the variety of behavioural characteristics underlying the citation patterns found in the literature … This is, however, the consequence of the semiotic inversion of the reference into the citation. The citation no longer betrays from what type of reference it was produced" (**Wouters**, 1999, p. 574).

A citation theory that links citations to scientists' citing behaviours is a "dead end" (**Wouters**, 1999, p. 575). With our proposal of the SSCT based on the social systems theory, we agree with this assessment and break away from the focus on citing behavior in citation theory.

2.5. References as threat signals

Nicolaisen (2004) maintains that past theories, mainly the normative theory and social constructivist theory of citing have not been able to fully explain what makes authors cite others and what makes them choose to cite some resources and not others. He suggests that citation behaviour and citations can be explained based on the "handicap principle" in bibliology and evolution (see **Zahavi**, 1975; **Zahavi**; **Zahavi**, 1999). Borrowing from this principle, **Nicolaisen** (2004) points to references as "threat signals" like those that exist in nature (e.g., approaching a rival). He argues that dishonest referencing can threat the reputation and validity of authors, specifically when they are being observed and evaluated by skilled authors, who can easily detect false references. His theory assumes that authors try to make honest references in their scientific works because they want to avoid any potential criticism by the scientific community. **Nicolaisen** (2007, p. 629) maintains that

> "citing authors honestly credit their inspirations and sources to a tolerable degree-enough to save the scientific communication system from collapsing".

However, he does not believe that all citations are honest, but most are, because authors are fearful of being attacked by their peers (**Nicolaisen**, 2007).

2.6. Elements in the process of citing publications

Since the single (traditional) theories are not able to fully explain citation motives, **Tahamtan** and **Bornmann** (2018a) proposed a conceptual model to explain the core elements in the process of citing publications. This model explains the processes through which an author decides whether or not to cite a scientific work. The model has been developed based on the empirical literature on citations and includes three elements:

- cited document,
- from selection of the document to citation of this document, and
- citing document.

According to this model, the features of both cited and citing documents affect an author's decision whether or not to cite a document.

Tahamtan and **Bornmann** (2018a) explain that authors use various criteria to select a document, such as the accessibility of the document, the perceived quality of the document, the reputation of the journal in which the document is published, and its relevance. Other, rather critical factors also affect authors' citation decisions, such as the journal's referees requiring a (extraneous) document to be cited. The model by **Tahamtan** and **Bornmann** (2018a) explains that the citation decision process is more complicated than what is reflected in past theories, namely the normative and constructivist theories. The model explains that in some cases, only one criterion may be enough for an author to reject a document for citing (e.g., because it is published in a less-known journal) without considering other aspects of that document (e.g., its relevance). In other cases, more than one criterion is crucial for citing a certain document or desisting from citing. Thus, an individual and its circumstances (education, objectives, necessities) which can change in time and other factors such as collaborators can influence a citation to be given or not given.

2.7. The disadvantages of the past theories

Scholars' citing behaviours include a set of interrelated mechanisms (**Mingers**; **Leydesdorff**, 2015) and decision processes (**Tahamtan**; **Bornmann**, 2018a) that cannot entirely be explained within the contexts of past citation theories. Thus, neither the proposed models nor the normative and social constructivist theories can completely and independently explain the citation behaviour of scholars.

Authors and their motives to cite are at the focal points of previous citation theories and models. Past theories and models failed at the complex nature of motives to cite, because they are not able to reflect this complex nature. Theories and models would profit from not relying on the very different motives to cite, which are difficult to identify and integrate in one theory or model. For instance, one might have the impression that an author cited paper x, because it has been published in a prestigious journal, and for the reputation of its authors. An interview with this author may reveal, however, that she cited paper x because she knew the author of paper x (and her work) from a conference dinner. This interview may or may not reveal the author's real citation motives. Thus, there can be a difference between assumed, communicated, and real motives, and it is hard to reliably and validly explore the motives of citing authors (in empirical studies).

> Many previous studies have discussed the persuasion nature of citations, that the main purpose of citing is not to acknowledge previous scholars, but to reach scientific, political, and personal goals

In this paper, we propose Luhmann's social systems theory as a solution to the problem of basing a citation theory on motives to cite. The social systems theory focuses on communications and not on humans and their motives. Humans are not part of social communication systems but are connected with them. Thus, the SSCT does not have the problem of integrating various and very different motives to cite (on one side) but is able to integrate approaches of past citation theories (on the other side).

3. Luhmann's systems theory

The systems theory of Luhmann is one of the most recent social theories that is based on the premise that three basic autopoietic systems (self-reproductive systems) constitute society. These three autopoietic systems are

- living systems,
- social systems, and
- psychic systems (see figure 1).

Autopoietic systems, such as biological cells, reproduce their basic elements on their own terms for their survival; otherwise, the system will disappear, as a plant will disappear without making its own cells (see **Seidl**, 2004). The operative closeness of systems and its recursive operations have been named as autopoiesis, which means a system can maintain and reproduce itself.

> "Living systems reproduce themselves on the basis of life; social systems reproduce themselves on the basis of communication, and psychic systems on the basis of consciousness or thoughts" (**Seidl**, 2004, p. 5).

The system that composes societies is the social system (see Figure 1). Each social system (e.g., the science system) selects and builds an environment (also called a boundary) for itself that differentiates it from other social systems. While the environments or boundaries are usually complex, the social system functions in a way to reduce the complexity of its environment. For example, each system can be composed of several sub-systems that each functions to counter the complexity of its environment (**Görke**; **Scholl**, 2006; **Meyer**; **Gibson**; **Ward**, 2015).

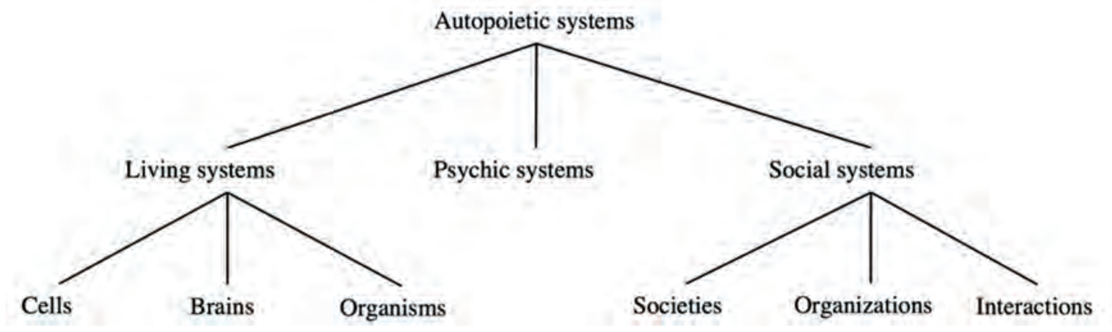


Figure 1. Types of autopoietic systems (**Luhmann**, 1986, p. 173)

According to the social systems theory,

(a) systems have different functions and operate inter-dependently of each other. They mutually interact and communicate in a variety of ways to achieve a common goal (known as structural coupling in Luhmanns' theory) (**Meyer**; **Gibson**; **Ward**, 2015). For instance,

> "social and psychic systems are conceived by Luhmann as two different types of systems, separate from one another but coupled via media such as meaning and language" (**Stichweh**, 2011, p. 295);

(b) systems are different from each other by the form and semantics of communication; and

(c) systems generate different views on reality (each system is monocontextural).

Thus, a society is composed of different perspectives on reality. Different views on reality, different functions, and different forms and semantics make communication among systems problematic. For instance, research ideas are being generated by the psychic system (a researcher) and are being communicated within and by the science system, while at the same time, the research ideas may have been proposed to influence "a system responsible for the public policy" (**Meyer**; **Gibson**; **Ward**, 2015).

> We propose Luhmann's social systems theory as a solution to the problem of basing a citation theory on motives to cite

The relatively new theory of Luhmann (compared to traditional social theories) is of special interest to be used in the development of a theory of citations for two reasons:

(1) it integrates previous, yet conflicting social theories (i.e., the relativistic and structure-functional approaches) in its conceptualization (e.g., **Berger**; **Luckmann**, 1966; **Parsons**, 1951). Thus, the theory can be used as an integrating theory for the citation process.

(2) The social systems theory focusses on communications (and not humans) as the basic constituting elements of a social system. According to Luhmann, the basic unit or element of a social system should not be humans, because the constituting element of the social in the community is communication (**Görke**; **Scholl**, 2006).

Luhmann believes that it is inappropriate to describe a society on the basis of humans and their behaviours,

> "because individuals' contexts differ in so many respects that it seems more adequate to analyse different spheres, contexts or problems as units than subjects" (**Görke**; **Scholl**, 2006, p. 643).

This (new) focus on communications rather than humans can be considered as a paradigm shift in sociology (**Leydesdorff**, 2001) which makes the theory of great interest for explaining the citing process. Therefore, it can be said that the formal citation process consists of communicative events, and the links within citation networks constitute social systems in science.

In the following section, we explain the constitutive elements of the social systems theory and discuss them in the context of a theory of citations (SSCT). The description of the elements will be mainly based on **Luhmann** (1992). In this book, Luhmann describes and explains the science system based on his social systems theory. Since the introduction of the theory, some papers have been published in scientometrics that have made a connection to that theory. For example, **Riviera** (2013, p. 1449) conceived science as an

> "autopoietic cognitive domain [i.e., a social system], and communicative events as the elements of this system, allows us to interpret citations as devices through which the structuration process in scientific communities is accomplished".

Many connections to the social systems theory can be found in **Leydesdorff** (2001) and other publications by him (e.g., **Leydesdorff**, 2009; **Leydesdorff**; **Hoegl**, 2020).

3.1. Communications as the elements of social systems

Traditionally, the basic elements of a social system have been mentioned to be people and their actions. In contrast, Luhmann chooses "communications" as the main element of a social system. **Luhmann** (1986, p. 174) noted that

> "social systems use communications as their particular mode of autopoietic reproduction. Their elements are communications which are recursively produced and reproduced by a network of communications and which cannot exist outside of such a network".

For Luhmann, communication is not the process of transmitting information from A (sender) to B (receiver); instead, it consists of four components (**Seidl**, 2004):

- Information (selecting information from a variety of choices),
- Utterance (how and why the information is being communicated),
- Understanding the meaning (no matter what information the sender has in mind, it is the receiver who interprets the message),
- Selection between "acceptance or rejection of the meaning of the communication" (**Seidl**, 2004, p. 9).

The four components indicate that a series of selections constitute communication (see Figure 2):

> "first, an information (out of a horizon of possible meanings) must be selected; second, this information must be addressed by an utterance (out of a horizon of possible addressees and modes of expression); and third, this difference between information and utterance must be understood. It is only the third selection of understanding which at minimum completes communication. The utterance can be viewed as the action component of communication" (**Görke**; **Scholl**, 2006, p. 648).

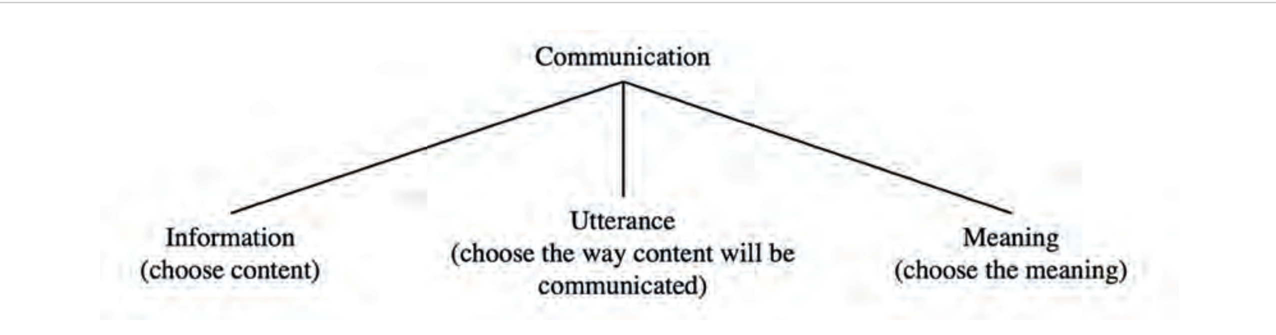
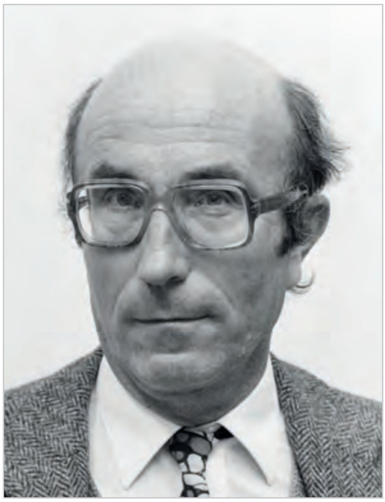


Figure 2. Social system's communication (**Silva**; **Sibertin-Blanc**, 2017, p. 125)

The main element in communication is understanding. In communication, the receiver's understanding of the message is important, no matter what the speaker has in mind (**Baecker**, 2001). Understanding is part of the first communication, and the selection between "acceptance" or "rejection" is part of the proceeding communication that takes place later. Both guarantee reproduction of communications over time (**Seidl**, 2004).

Other autopoietic systems besides social systems in Luhmann's view are psychic systems. How the psychic systems comprehend the communication is not initially important for the communications that are about to take place. For instance, "yes" could be understood as a question, while another psychic system could interpret it as an approval. However, what psychic systems think about communications may eventually lead to different communications to take place (**Seidl**, 2004).

> "Thus, although psychic systems are necessarily involved in bringing about communication, the communication (as this unit) cannot be understood as the product of any particular psychic system" (**Seidl**, 2004, p. 8).



Niklas Luhmann

The focus on communication in a theory of society is very suitable for a theory of citations: publishing and citing are communicative events by their natures. **Luhmann** (2012a; 2012b) locates psychic systems (i.e., human brains) outside the social systems (see Figure 1). When we embed the citation process in this theoretical framework, psychic systems (authors) would irritate or stimulate formal communications (publications and their citation links) in the science system. The citation links exist in the matrix of cited and citing publications in the social system (defining the web of knowledge). By excluding humans from social systems, the theory of **Luhmann** (2012a; 2012b) displaces humans' motives and reasons to citing scientific works in the periphery of the social system (i.e., in the psychic systems). In other words, authors' motives, and reasons to cite belong to the psychic systems while citations as communicative elements reside in the (social) science system. Both systems operate autonomously (i.e., have their own independent identity) but also communicate and interact with each other (and with other systems) to achieve a common goal: the psychic systems of authors are structurally necessary for establishing publications and citation links in the science system (both systems are structurally coupled). Psychic systems (authors) irritate or stimulate the science system:

> "every system needs stimulations or irritations from outside the system, although these external stimuli cannot determine the operations of and within the system" (**Görke**; **Scholl**, 2006, p. 648).

3.2. Science is a social system that is based on communications

The science system can be considered as a social system capable of reproducing its elements through its components. Social systems themselves generate all system processes, and no operation in the system is being carried out from outside. This does not imply that the system is not in contact or interaction with the environment outside the system. It only means that the system itself is carrying out the operations, although operations inside the system are influenced by external forces in the environment (**Seidl**, 2004). For example, a science system is being influenced by economics, pandemics, sanctions, wars, and other (global) issues. However,

> "these influences can never determine what operations come about … external events may trigger internal processes, but they cannot determine those processes" (**Seidl**, 2004, p. 3).

Therefore, like many other systems, the science system is structurally coupled to other systems in its environment (**Seidl**, 2004).

Luhmann (1992) conceives science as a social system. Like any other social system, the main element or unit in the science system is communication: the system exists and operates based on communication. The science system is composed of "communicative elements": communicative elements are recursively linked to other communicative elements and constitute the system in this way. Science without communication would not exist (exactly as the legal system cannot exist without communication). This focus on communication in the science system implies (among other things) that communication is not directly connected to thoughts (e.g., ideas or facts) by researchers. Thoughts are only directly connected to other thoughts in the mental processes of single researchers. The emphasis on the importance of communication in the description of the scientific endeavour is not unique to the social systems theory by **Luhmann** (1992) but can be found in other publications of the sociology of science literature. For example, for **Abelson** (1980, p. 60),

> "the key element in the building and preservation of this marvellous edifice is communication. Without communication, there would be no science".

3.3. Science is based on publications and their citation links

Like other social systems in society, many different types of communications (publications, personal communications, group discussions, presentations, etc.) exist in the science system. The science system mainly reaches its compatibility (in the sense of connectivity and closeness) through communication based on publications (**Luhmann**, 1992). Publications are the operative medium for the spreading and storage of knowledge proposals. Without new publications (including knowledge proposals), the science system would no longer exist. Nearly all disciplines in science are not imaginable without the continuous stream of new publications with the corresponding knowledge proposals and their rooting in previous proposals by citations.

The (worldwide) archive of publications is a place that absorbs and stores an immense volume of publications that are connected by citations. The archive (as a social system) is differentiated by various disciplines (as its sub-systems), which helps to reduce the complexity of the archive. For example, researchers in a specific discipline do not have to search relevant literature in the whole archive. Researchers focus on the knowledge stored in the archive in the same disciplines, because researchers are –as a rule– the audience of other researchers from the same discipline (**Luhmann**, 1992). Although each discipline has its own discipline-specific environment (boundary), they mutually interact with other relevant disciplines. Interactions between disciplines can be traced and manifested in citations listed in publications and co-authorships.

3.4. Science is conceived as an evolutionary system

Luhmann (1992) views the science system as an evolutionary system. In his view, the evolutionary system produces publications in a similar way as the surrounding world produces organisms –with a lot of surpluses, openness for selections, and missing predictability. Research ideas stem from psychic systems and are random events in the science system that turn up in publications (seldom) or not (mostly). Many publications are rarely read by researchers or used in subsequent research. Since the total stock or archive of publications and its complexity increase every year, one could question the necessity for new publications. The operational continuity of producing new publications is ensured yet, because

(i) most of the publications end with at least one new research question that arises from the reported research;

(ii) communicating research results based on publications is a standard approach in most disciplines; and

(iii) governments implement measures based on research to tackle societal problems (e.g., research on the COVID-19 outbreak).

Three features of the evolutionary science system are "variation", "selection", and "stabilisation". The variation within the evolutionary science system refers to the processes that are located inside and outside the science system. Researchers have new research ideas, some of which are possibly investigated in research projects, the results of which are perhaps communicated within manuscripts. New research ideas are random processes in the science system that are located outside of the social science system, primarily in researchers' psychic systems. The variation within the evolutionary science system is triggered by the focus on problem-identification and problem-solving in science (**Luhmann**, 1992), opening up various combinations to investigate the same phenomenon. Inside the science system, manuscripts are submitted to journals, and reputable journals select only a few manuscripts for publication. Many manuscripts are published in less well-known journals or on preprint servers (such as the *arXiv*). The available space on servers and journals lead to a continuous and broad stream of newly published research. The process of selection within the evolutionary science system refers to the usability of reported results in publications. Some results attract attention from other researchers and are included in the stock of useful knowledge, but many results do not reach this status. Valuable knowledge can be found, e.g., in the thematic literature, overviews, and textbooks (for students). In the context of an evolutionary view on the science system, **Armstrong** (1982, p. 85) speaks about a

> "'marketplace for ideas' [that] provides an efficient way to separate the good ideas from the bad. Under this system, scientists write papers to advocate their viewpoint. These papers are examined by secret peer review, and then are published and subjected to further review by readers".

The continuity of its specific (publication-based) communications ensures the "stabilisation" of the science system: it is nearly all researchers' task to write down their results in publications and researchers are assessed by their ability to fulfil this task. The science system differs from evolutionary processes in the animal world, because in science, intentional processes are involved: researchers' purposeful actions in research lead to new publications. However, these intended actions are events in the environment of the science system (see above). A publication might be produced based on specific intentions, such as societal or topic-specific needs; the community decides at the end (e.g., based on peer review decisions or citations) whether the publication is compatible or not. One could imagine that innovative and risky research that continuously questions basic knowledge in disciplines lead to a loss of a stable science system: the system may move from the prevalent normal science to a predominant revolutionary science system (**Kuhn**, 1962). The stabilisation of the science system profits, however, from the tendency of researchers to critically react to novel (revolutionary) research. For example, the journal peer review system has been criticized with respect to the so-called conservative bias, the tendency to reject innovative and risky manuscripts (**Campanario**, 1996).

3.5. The science system operates its closeness by formalized links: citations

In the modern science system, researchers are requested to separate own discoveries from knowledge generated by other researchers. Since discoveries are usually reported in publications, the separation occurs by providing sentences with citations to other publications. It is specific, therefore, for the science system that links between communications on research are formalized and visible through citations. In other social systems, communications are also linked together, while the subsequent communication refers to the previous communication content. The usual social system emerges yet by self-referential communications that can be identified by revealing their meaningful connections. Since most social systems are transitory events that are not recorded, it is not naturally possible to track their operations. In the science system, however, the tracking of operations is possible for the communication channel (i.e., academic publishing) that mainly defines the closeness of the system. Conventionally, the links to previous research (publications) are included as citations in the text body; the cited publications are reported then as references (mostly at the end of a publication in a listed form).

The citation of publications is a strong type of scientific behaviour that is normatively prescribed (see **Luhmann**, 2006c). Nearly all scientific publications contain at least a few cited references. In science communication, reporting references is so crucial that many researchers even include these links in their presentations (at conferences or meetings). Citations establish relations selectively, since in research on many topics, not all relevant publications for particular research can be cited. In the case of new research areas, it might be possible to cite all relevant publications (e.g., at the beginning of the *h* index research, in 2005 and 2006, all research papers on the *h* index could be cited in principle), but this is not possible in mature areas (e.g., the area of measuring impact through citations). In mature areas, mechanisms of selection have been established to reduce complexity. For example, "obliteration by incorporation" describes the phenomenon that accepted and well-known knowledge in the community is no longer provided with citation links (**Merton**, 1988). The continuously used knowledge has condensed to lessons learned in the community (**Luhmann**, 2006a). For example, the *Journal Impact Factor* indicator is so well-known in the scientometric community that it is mentioned currently in the literature without reference to the paper introducing the indicator.

Citation indexes such as the *Web of Science* (*WoS*, produced by *Clarivate*) or *Scopus* (*Elsevier*) provide access to the science communication structure based on publications and their formalized links. The social system structure based on both communicative elements (publications and their formalized links) can be visualized by using data from the citation indexes. As an example, Figure 3 demonstrates a social system that consists of a citation network of papers published

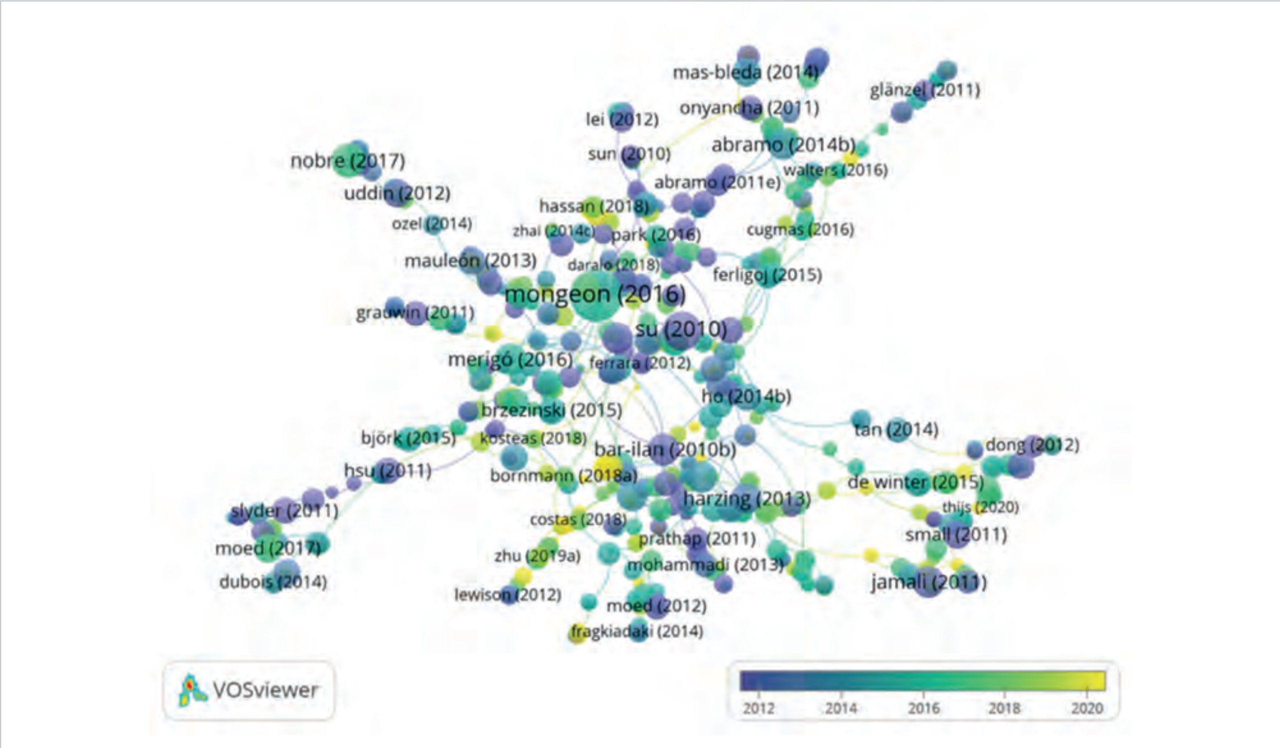


Figure 3. Citation network of papers published between 2010 and 2020 in *Scientometrics* (based on *Crossref* data visualized by the *VOSViewer* software). Nodes are single papers (node sizes reflect overall citation counts), and lines denote citation links within the journal. The nodes are coloured by the publication year.

between 2010 and 2020 in *Scientometrics*, based on *Crossref* (*https://www.crossref.org*) data visualized by the *VOSviewer* (*https://www.vosviewer.com*) software.

In this system, nodes represent single papers connected through lines that denote citation links within the journal. The nodes are coloured by the publication year of the cited paper. Such networks based on publication and citation data reveal field-specific parts of the complete science system's structure, where publications are nodes and citations are links between nodes. On one side, the structure is dynamic and changes with the appearance of new publications and their connections to other publications using cited references. On the other side, the system is closed, since it is defined by publications and their citation links.

3.6. Truth and autopoiesis

According to **Luhmann** (1992), any functional social system (such as law, politics or science) uses a code of its own that is specific for the communication in the system. The scientific communication is oriented towards the code "true" or "not true": communication (established knowledge, new ideas, etc.) is processed in the science system against the background of "true" or "not true". Every knowledge proposal coded as "true" may be read, published, and cited, and every knowledge proposal coded as "non-true" may be sorted out.

The code can be seen as a catalyser that animates to assess information somehow; it predetermines the medium in which the scientific communication happens. Only by the existence of the code "true" or "not true", the system

(I) is differentiated from other societal systems, that each uses its own codes;

(ii) is able to operate autonomously; and

(iii) is able to accumulate knowledge (**Luhmann**, 1992).

The focus on "truth" in the conceptualization of science is not only specific to the social systems theory of **Luhmann** (2012a; 2019b), but can also be found in the conceptualization of science by **Popper** (1959). **Williams** (2012) explains that according to Popper,

> "the search for truth was … the strongest motivation for scientific discovery. His role was to determine how we can ascribe truth to the claims made by science, religion and politics".

Second-order observations (i.e., peer reviews) have an essential meaning in science: researchers (peers) are necessary in the system to operate in the medium of "truth" by differentiating between "true" and "not true" knowledge proposals in publications. Researchers try to have a chance of being accepted by second-order observations by providing evidence and validation (**Luhmann**, 2020b). Truth functions as a symbol for "being reliably reviewed" or "being reliably confirmed". For example, in the journal peer-review process, at least two experts from the same field (as the authors) review a manuscript to recommend publication or rejection of the manuscript. Published research results are only accepted by the community in a discipline when they have been confirmed in independent studies. Since the attribution of "truth" to certain results is always a hypothetical event, it can be said that the examination and validation of knowledge is never finished. In the process of producing and validating of knowledge proposals, each researcher has a double role: he/she is producer of knowledge proposals and at the same time observer of other researchers' proposals. The essential meaning of second-order observations in the conceptualization of science emphasizes the importance of communication in the system: only communicatively proposed and assessed research can finally lead to valid knowledge.

The operative closeness of the science system can be observed by the fact that academic publications mostly cite other academic publications (and not newspaper articles or tweets) (**Haunschild**; **Bornmann**, 2020). The reported research might be stimulated by non-scientific material, but the (communicated) research is operatively connected to previous (communicated) research. The autopoiesis of the science system is formally ensured through publications: most of the publications have cited other publications and are selected for being cited in future publications. Therefore publications and citations hold what characterizes autopoietic systems in general: every end is a beginning at the same time (**Luhmann**, 1992). Citation links establish and enable the science system's autopoiesis: citations guarantee the connectivity (compatibility) of research and connectivity allows information retrieval and navigability through the science archive.

3.7. Structural coupling and irritation

As mentioned above, in the social systems theory, systems operate autonomously (autopoietically) but also interact with other systems. Autonomy is not equal to self-sufficiency because a system needs to be connected to and interact with other systems to achieve certain (superior) goals (**Görke**; **Scholl**, 2006). For example, innovative products (such as quantum computers) can be preferably developed in the interaction of science and economy. The link between a system and other systems "within its environment is called either interpenetration or structural coupling" (**Görke**; **Scholl**, 2006, p. 648). This means for the science system that it is connected to other (social) systems through structural couplings, although the system operates autonomously with recursive operations.

Several structural couplings can be seen between sub-systems of the science system and other systems. For example, research on climate change or COVID-19 is coupled with certain (researchers') psychic systems or the policy system (**Bornmann** *et al.*, 2022; **Yin** *et al.*, 2021). Ideas of psychic systems can be read in publications; and policy-science interactions are reflected in citations of papers in policy documents (**Yin** *et al.*, 2021). Interactions within and between systems are facilitated by "brokers" who influence each other, affecting the whole system (**Meyer**; **Gibson**; **Ward**, 2015). For example, authors are "knowledge brokers" who select and cite scientific works, or reviewers are "science evaluation brokers" who operate in second-order observations.

The precise boundaries of systems (e.g., the science system, psychic systems, or the policy system) guarantees that there are no crossing operations between (sub-)systems (specific communications or thoughts), but there are inter-dependencies between (sub-)systems through reciprocal irritations. For example, in the science system, communication of knowledge proposals is dependent on new ideas (psychic systems) and public funds (policy systems). Relevant events in the environment are registered in the (disciplinary) recursive network of the science system. Irritating events lead to structural changes (i.e., changes in the communication structure) in the science system: the science system is financed by the policy system, and the financial input may be combined with specific interests in certain research topics (e.g., the development of a certain vaccine). These processes are important for the scientific endeavour's success, but they do not change the fact that the science system operates autonomously with its specific structure producing knowledge with the requirement of "truth" (**Luhmann**, 1992). Social constructivists have a strong focus on these elements that have been named by Luhmann as irritating events. By relocating these elements in the environment of the science system, the social systems theory is able to integrate the structure-functional position that science acts as a functional system in the society (by producing reliable knowledge) but is influenced by non-scientific elements at the same time that irritate science communication.

Some science disciplines such as medicine have stronger interdependencies with other systems (e.g., the public health system) than other disciplines such as mathematics. Stronger interdependencies might lead to higher societal recognition, awareness, and reputation of a particular discipline (**Luhmann**, 1992).

3.8. Programs of the science system

The assignment of "true" and "not true" can only be performed in the science system, because only the science system has established the necessary programs for reliable and valid assignments. These programs are structural elements of the system that are applied by researchers. Specific methods (e.g., statistics) and study designs (e.g., random sampling or surveys) belong to these elements and include rules and approaches for scientists' work. Scientific statements are formulated in the context of theories –another structural element– that support the decisions whether statements are "true" or "not true". Other elements (besides methods, designs, and theories) are norms formulated in the ethos of science (see section 2.1) and reputations gained by researchers, institutions, or journals. Norms (as moral and technical instructions in science) and reputations (as mechanisms for allocating rewards and recognition) regulate scientific communications by channelling and regulating actions and communications of scientists. Reputation serves as a preselection mechanism that initially acts as an indication of "truth". Research published by reputable journals or researchers has a higher probability of being "true" than research published by unknown journals or researchers. On the one hand,

> "reputation reduces complexity for scientists whose limited span of attention necessitates decisions about whom to listen to, whom to ignore, whom to ridicule, and whom to take very seriously" (**Fuchs**, 1992, pp. 71-72).

On the other hand, reputation is

> "a resource scientists can use to give their statements more credibility" (**Fuchs**, 1992, p. 72).

3.9. Normative and constructivist roots of the social system theory

Luhmann (1992) treads the path of integrating the social systems theory in the (i) structure-functionalism and (ii) social constructivism (tradition).

(i) According to **Luhmann** (1992), it is specific for the science system that knowledge proposals are produced, and the existing knowledge pattern is changed over time (e.g., by dismissing existing knowledge and including new knowledge). It is a specific structure-functional position that only the science system can fulfil the function of producing new and "reliable" knowledge by orienting towards "truth" in its communication (**Weingart**, 2003). The science system, with its specific communication and programs, has been established to fulfil this function over decades. The focus on this function differentiates science from other social systems, with their own specific functions in society (see **Weingart**; **Pansegrau**; **Winterhager**, 1998).

(ii) **Luhmann** (1992) roots the social systems theory in a mathematical concept proposed by **Spencer-Brown** (1969). The starting points of the concept are two operations of psychic or social systems: to "distinguish" and to "observe". In the science system, psychic or social systems "create" (construct) the external world by distinguishing and observing (and indicating) different phenomena (in empirical or theoretical studies). Psychic or social systems observe phenomena in the environment that might be of interest to study and present the results of these observations in publications. Knowledge then is the result of "observations" and "descriptions," and these are communicated in the social system by publications (**Luhmann**, 1992). The framing of the social systems theory by **Luhmann** (1992) in the mathematical concept proposed by **Spencer-Brown** (1969) means that knowledge cannot be uncoupled from the observer (i.e., the context of the observer with specific research conditions and colleagues) (see here **Simon**, 1988). Knowledge can only be objectivized (validated) interpersonally (independent of only one observer) if different studies come to similar conclusions (under similar research conditions).

By rooting the social systems theory in the mathematical concept proposed by **Spencer-Brown** (1969), the theory is genuinely grounded in a constructivist approach: the (science) system observes (investigates) the world (its environment) by communicating about the world. The world only exists as communicative elements; the reality of the science system is constructed in the system by its specific code that is oriented towards truth (**Luhmann**, 1992). In other words, the system is an observer who perceives its environment by using its own –"truth"– lens (**Lau**, 2005). The specific programs for observing the environment through this specific lens ("true" or "not true") has been evolved in the development of the modern science system.

4. Conclusions

4.1. The need for a new theory

Most empirical studies in evaluative bibliometrics have relied upon the normative and social constructivist theories of citations (see sections 2.1. and 2.2). Both theories use human motives to explain links between publications via citations. Since both theories have specific limitations, some attempts have been made over the past several decades to propose other theories and models of citations (see sections 2.3 to 2.6). However, none of them have been able to provide a comprehensive theoretical framework for citing. The main issue with past theories is that the basic elements constituting them are citation motives of scholars which have a very complex nature. The motives to cite are very different and identifying and integrating them all, which past theories tried to do, seems to be almost impossible. Thus, we propose that a citation theory should instead focus on (an) element(s) other than citation motives (i.e., communications).

4.2. The new citation theory –SSCT– and its potential

To avoid the problem of basing a citation theory on citation motives, we propose that a citation theory should focus on communications, and not humans and their motives. We adopt this idea from the social systems theory of Luhmann, who maintains that the basic element of any social system is communications and not humans. Thus, the social systems theory does not have the problem of integrating various and very different motives to cite, which makes the theory of great interest for the citing process. Although motives to cite are not part of the social science system, they are part of the social systems environment (the psychic systems), they can be theoretically considered.

According to the social systems theory, systems have different functions, views on reality, and semantics, build their own boundaries, and operate interdependently of each other, which in turn make communication among systems problematic. For instance, the psychic system (researchers) generates research ideas, the science system communicates some of these ideas, and a social system responsible for public policy may be impacted by or use a selection of those ideas (**Meyer**; **Gibson**; **Ward**, 2015).

Traditionally, the basic elements of a social system have been humans or actions, while Luhmann believes humans have very different behaviours (in different social contexts) so that the constituting elements of a social system should not be based on humans, but based on communications (**Luhmann**, 1986). Psychic systems or humans perceive communications differently, resulting in different communications to occur. For instance, "yes" could be understood as a question by one psychic system or as an approval by another psychic system. Thus, although a presence of a psychic system is pivotal to the communication to occur, it is not the product of any psychic system (**Cooren**; **Seidl**, 2020; **Seidl**, 2004).

The citation process can be explained based on Luhmann's theoretical framework: authors' motives to cite belong to the psychic systems while publications and citations belong to the science system. Both systems operate autonomously but also interact with each other: the psychic systems of authors are structurally essential for establishing citation links between publications in the science system, because it is the psychic systems that stimulate or irritate the science system, but the psychic systems cannot determine the operations of and within the science system (**Görke**; **Scholl**, 2006).

4.3. Practical implications

Luhmann's theory –the SSCT– has the potential to underly and reorient empirical research in bibliometrics.

For example, citation networks (see Figure 3) can be produced (based on *WoS* or *Crossref* data) that reveal social systems in science (e.g., topic-specific networks). A science system created in this way reveals a citation network where nodes are publications connected through lines that represent citation links. Each citation network reveals certain parts of the science system's structure. The structure is dynamic and changes with the appearance of new publications and their connections to other publications using cited references. The network can be described and explained based on the terms and concepts of the SSCT.

Another related example is the promising use of the SSCT in evaluative bibliometrics. The SSCT gives advice and support to a new (promising) trend in evaluative bibliometrics to go away from simple citation counting towards analysing citation networks. This trend has at least two reasons: (1) scientific impact is a complex phenomenon with many facets that cannot be deduced to a single number such as citation counts. (2) Publication and citation data are rich meta-data that allow more than simple citation counting. The increasing popularity of the *VOSviewer* program for analysing data from *WoS* or *Scopus* for conducting bibliometric studies (see Figure 3) reflects this trend in bibliometrics. In the bibliometric literature, many empirical examples can be found that demonstrate the trend in recent years.

One example of this trend is the study by **Ràfols** *et al.* (2021) who map publications to *United Nations*' sustainable development goals (SDGs) to measure societal impact (relevance) of research. The authors explain their network approach for measuring impact as follows:

> "given the variety of understandings regarding the relationship between research and SDGs, we propose that bibliometrics analysts should not assume that there is one single, preferred or consensus way of mapping SDGs to publications. We propose instead that, since different stakeholders have contrasting views about the relationships between science and SDGs, the contribution of bibliometrics should be to provide a plural landscape for stakeholders to explore their own views" (**Ràfols** *et al.*, 2021, p. 1).

Another example is the study by **Skov**, **Wang**, and **Andersen** (2018). The authors propose science networks –knowledge domain visualizations– that are based on keywords in papers on a certain topic or field. It is an explicit aim of the visualizations not only to reflect (field-specific) science communications, but also to use the maps for strategic functions (in evaluative bibliometrics). For example, the maps can be used to

> "invade new areas (the analysis shows that a research group is not present in a new and promising part of the map –should they try to include it, e.g., by letting a member of the group specialise in it, hiring an established researcher or setting up a collaboration with another institute?)" (**Skov**; **Wang**; **Andersen**, 2018, p. 273).

Other studies reveal that citation data can be analysed not only as communicative events, but also as events that are irritated by certain motives to cite. For example, **Bornmann**, **Wray**, and **Haunschild** (2020) introduced the so-called citation concept analysis. The method can be used to explore why highly-cited publications were cited later on: which concepts from the publications were of interest for the citing authors? The study by **Catalini**, **Lacetera**, and **Oettl** (2015) investigated citation impact with a focus on negative citations. With the focus on negative citations, **Catalini**, **Lacetera**, and **Oettl** (2015) analyzed –in terms of the SSCT– irritations of the social system (citations) by psychic systems (critical assessments of cited papers).

4.4. Future research

Our proposal to focus on the social systems theory for conceptualizing citation decisions can be understood as an attempt to overcome, improve or converge previous theories into a theory with greater explanatory capacity. However, our attempt needs to be further explored, substantiated, and theoretically contrasted in future studies. For example, the potential of the SSCT could be investigated by contrasting it with theories of other sociologists such as Pierre Bourdieu. With respect to the complex nature of citation motives, it might be interesting to incorporate Bourdieu's concepts referring to power or symbolic capital into the contrasting citation theory. Further contextual factors such as the language of publication, the fame or reputation of the journal, the country, sex or academic rank of the authors, among others are linked to citation decisions and could be additionally considered. Citation decisions are also influenced by factors of a more psychological nature, which do not seem to have been investigated in depth in empirical studies. Since in the SSCT, citations are dissociated from their context (e.g., social, historical, cultural, economic or political) and from the people who have produced them, in order to state them as abstract "communications," Pierre Bourdieu's theoretical attempt might offer another interesting path to understand citing processes.

> The SSCT gives advice and support to a new (promising) trend in evaluative bibliometrics to go away from simple citation counting towards analysing citation networks

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Análisis de las comunicaciones en *Twitter* de las *Fuerzas Armadas* y *Cuerpos de Seguridad*: un modelo empírico

Analysis of the *Twitter* communications of the Spanish Armed Forces and State Security Forces: an empirical model

José-Miguel Pina

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Resumen

Las redes sociales se han convertido en uno de los canales de comunicación más usados por todo tipo de organizaciones, incluyendo las de seguridad y defensa. Concretamente, este trabajo se centra en la utilización de *Twitter* por parte de las *Fuerzas Armadas* españolas y los Cuerpos de Seguridad del Estado, tratando de analizar los factores que influyen en el *engagement* de sus tweets. Para ello, se propone un modelo empírico que, sobre una muestra de 14.540 tweets, permite explicar cuál es el rol de una serie de variables que miden los diferentes atributos de tipo racional y emocional presentes en sus comunicaciones. Estas variables se identifican mediante una combinación de técnicas que incluyen el uso del lenguaje *Python* y *VBA*. Posteriormente, con *IBM SPSS* se procede a la estimación de un modelo *logit* que muestra el efecto de cada una de las variables consideradas sobre la probabilidad de que un tweet genere mayor o menor *engagement*. Los resultados muestran que los seguidores de las cuentas de carácter militar, tal como la del *Ejército de Tierra*, suelen interactuar más que los usuarios del resto de cuentas examinadas, a pesar de que tienen un menor número total de seguidores que las cuentas de los cuerpos policiales. Además, los resultados confirman la importancia tanto de utilizar estímulos racionales como emocionales para que un mensaje sea efectivo. En particular, se recomienda que la información esté sustentada en la utilización de elementos como hipervínculos, emojis, fotografías y alusiones a temas que apelen a las emociones de los individuos como, por ejemplo, el patriotismo.

Palabras clave

Redes sociales; Medios sociales; *Twitter*; Comunicación; *Engagement*; Análisis del sentimiento; *Fuerzas Armadas*; Ejército; *Armada*; Cuerpos de Seguridad; Policía; *Guardia Civil*; España.

Abstract

Social networks have become a major communication channel for organizations, including those focused on security and defense. This article specifically examines how the Spanish Armed Forces and State Security Forces communicate on *Twitter*, with the aim of analyzing the factors that influence engagement with their tweets. A model validated with a sample of 14,540 tweets shows the role that a series of variables related to rational and emotional communication attributes has. These variables are estimated utilizing techniques such as *Python* and *VBA*. Subsequently, a logistic model using *IBM SSPS* estimates the effect of each variable on the probability that a tweet will lead to more or less engagement. The results show that followers of military accounts, such as the Army, tend to have higher rates of interaction than followers of other accounts, even though military accounts have fewer total followers than police accounts. Furthermore, the results confirm the importance of using both rational and emotional stimuli for a message to be effective. To increase engagement, information provided by organizations should use elements such as hyperlinks, emojis, and photographs, and refer to topics that appeal to individuals' emotions, such as patriotism.

Keywords

Social media; Social networks; *Twitter*; Communication; Engagement; Sentiment analysis; Armed Forces; Army; Navy; Security Forces; Police; *Guardia Civil*; Spain.

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1. Introducción

Hace tiempo que las redes sociales se han sumado a los canales de comunicación habituales de las organizaciones. Y, dentro de estos canales, *Twitter* resulta especialmente valorado para establecer relaciones con los grupos de interés, reforzar la reputación corporativa y conseguir el compromiso o *engagement* de la audiencia (**Ballesteros**; **Herencia**, 2019; **Schlagwein**; **Hu**, 2017; **Wang**; **Yang**, 2020).

De acuerdo con el estudio bibliométrico realizado por **Noor** *et al*. (2020), en el que se revisaron más de 11.000 artículos sobre *Twitter*, la mayoría de los estudios realizados en esta plataforma se han centrado en eventos, tanto de ocio como relativos a crisis o catástrofes, y en ámbitos como la política, salud y educación. Sin embargo, en contextos como los organismos de tipo militar o policial la investigación disponible es muy escasa. Asimismo, los pocos estudios existentes examinan bien las *Fuerzas Armadas* o los cuerpos policiales, habiendo una falta de investigaciones sobre los patrones comunes en la comunicación en redes sociales, especialmente en España. Por ejemplo, **Carrasco-Polaino** y **Jaspe-Nieto** (2021) realizaron un análisis del *engagement* de las cuentas en *Twitter* del *Ministerio de Defensa*, mientras que trabajos como el de **Rodríguez-Andrés** y **López-García** (2019) o el de **Ortega-Fernández** y **Rodríguez-Hernández** (2021) han optado por examinar la presencia en redes de los cuerpos policiales españoles a través del análisis de contenido.

La respuesta de la audiencia hacia un tweet depende de una combinación de factores de tipo racional y emocional en la que el peso de cada componente puede quedar condicionado por la actitud hacia la cuenta emisora (**Oliveira** *et al*., 2022). En un sector de importancia estratégica, como es la seguridad y defensa, hay una necesidad latente de trabajos que permitan responder a preguntas como cuáles son las variables que más influyen sobre el comportamiento de los destinatarios de los mensajes; si tienen más peso los elementos racionales o emocionales, los atributos generales del tweet (ej. hashtags, hipervínculos) o las temáticas abordadas.

En particular, en el presente trabajo se propone un modelo con el que se intenta averiguar qué factores son más determinantes para que un tweet tenga mayor o menor efectividad en el caso concreto de las *Fuerzas Armadas* españolas (en adelante, *FAS*) y las *Fuerzas y Cuerpos de Seguridad del Estado* (en adelante, *FCSE*). Frente a modelizaciones previas que buscan predecir los likes ("me gusta") y retweets de forma independiente (**Deng** *et al*., 2021; **Heiss**; **Schmuck**; **Matthes**, 2019; **Oliveira** *et al*., 2022), esta efectividad la mediremos en términos de *engagement*, considerando la reacción general hacia el tweet (**Fernández-Gómez**; **Martín-Quevedo**, 2018).

La elección de *Twitter* como plataforma de análisis puede ser útil para complementar otros estudios que analizan aspectos como la difusión de las publicaciones, las actitudes y sentimientos del receptor (**Karami** *et al*., 2020; **McCormick** *et al*., 2017; **Noor** *et al*., 2020; **Zimmer**; **Proferes**, 2014). Asimismo, el trabajo planteado pretende abrir una reflexión sobre cuáles son los recursos en los que las organizaciones, en sentido amplio, tendrían que hacer más hincapié en sus comunicaciones en *Twitter*. Según el estudio anual del *Interactive Advertising Bureau* (*IAB*, 2021), el número de usuarios que se declara seguidor de marcas en redes sociales está cayendo gradualmente. En 2018 un 81% de los consumidores afirmaba seguir a las marcas por esta vía, porcentaje que cayó al 72% en 2019, al 52% en 2020 y al 48% en 2021. Ante este desinterés creciente hacia las cuentas organizacionales, los *community managers* o responsables de las cuentas deberían identificar claramente los tipos de contenido que fortalecen las relaciones con su audiencia.

En cuanto a la estructura, el trabajo adopta una disposición clásica. Así, en los siguientes apartados explicaremos el contexto de la investigación y el marco teórico, proponiendo una serie de hipótesis que conforman el modelo propuesto. Posteriormente se aborda la metodología y los resultados obtenidos. El artículo se completa con una exposición de las principales conclusiones, implicaciones y limitaciones.

> *Twitter* es una plataforma fundamental para las comunicaciones de las *Fuerzas Armadas* y las *Fuerzas y Cuerpos de Seguridad del Estado*

2. Contexto de la investigación

Como parte del proceso de comunicación estratégica o *stratcom*, en los últimos años ha aumentado el uso de las redes sociales en el ámbito militar y policial (**Rodríguez-Andrés**; **López-García**, 2019). Si bien las *FAS* se subieron al carro de las redes sociales más tarde que las *FCSE*, actualmente constituyen un canal habitual de información e interacción con la ciudadanía. En concreto, este trabajo dirige su atención a las comunicaciones en *Twitter* del *Ejército de Tierra*, el *Ejército del Aire* (denominado "*Ejército del Aire y del Espacio*" desde el 30 de junio de 2022), la *Armada*, la *Unidad Militar de Emergencias* (en adelante, *UME*), la *Guardia Civil* y la *Policía Nacional*. Junto con el *Centro Nacional de Inteligencia*, estas instituciones conforman los principales organismos españoles de seguridad y defensa.

La utilización militar de las redes sociales se remonta a la invasión de Irak en 2003, cuando muchos soldados estadounidenses compartían sus vivencias en el campo de batalla a través de los denominados *warblogs* (**De-Ramón-Carrión**, 2014). Más adelante plataformas como *Twitter* y *Facebook* se convirtieron en un instrumento más para transmitir información sobre las operaciones en tiempo real, realizar operaciones de influencia e inteligencia militar (**Del-Valle-Melendo**, 2018; **Hellman**; **Olsson**; **Wagnsson**, 2016; **Pintado-Rodríguez**, 2013). Además de predisponer favorablemente a la opinión pública, un uso adecuado de las redes también puede mejorar la percepción de las instituciones militares como "empresas empleadoras" (**Deverell** *et al*., 2015; **Joachim** *et al*., 2018). Las *FAS* no han permanecido ajenas a esta tendencia, apoyándose en canales como *Twitter* para difundir información encaminada a obtener una respuesta favorable por parte de la sociedad (**Carrasco-Polaino**; **Jaspe-Nieto**, 2021; **De-Ramón-Carrión**, 2014). En particular, las redes han sido fundamentales para la *UME*, usándose como canal para informar y proporcionar instrucciones de seguridad a las personas expuestas a situaciones de riesgo (**Hernández-Corchete**, 2021). La labor de este cuerpo, dependiente orgánicamente del *Ejército de Tierra*, fue especialmente visible durante los peores momentos de la pandemia del Covid-19, de tal modo que sus tweets, junto con los de *Policía Nacional* y la *Guardia Civil*, entraron en el *top ten* de los más compartidos en España (**Villodre**; **Criado**, 2021).

Al igual que en el *Ejército*, las redes sociales se han convertido en un poderoso recurso para las acciones de comunicación y de inteligencia en los cuerpos policiales (**Beshears**, 2017; **Egawhary**, 2019; **Kudla**; **Parnaby**, 2018). En España, la *Guardia Civil* y la *Policía Nacional* están realizando una magnífica gestión de sus cuentas, dirigiéndose al público general con un lenguaje fundamentado en la cercanía, respeto y sentido del humor (**Callejo-Gallego**; **Agudo-Arroyo**, 2019; **Padilla-Castillo**, 2016; **Rodríguez-Andrés**; **López-García**, 2019). Concretamente, la labor online de la *Policía Nacional* fue reconocida en 2015 con el máximo galardón de los *Premios Nacionales de Marketing* (*IPMARK*, 2015). En *Twitter* han conseguido más de 3 millones y medio de seguidores, con la curiosidad de que "la policía no sigue a nadie en *Twitter*", al menos oficialmente (*El País*, 2010). Y aunque el número total de seguidores es algo menos de la mitad, la cuenta en *Twitter* de la *Guardia Civil* comparte el privilegio de estar entre las tres más exitosas de carácter estatal (**Callejo-Gallego**; **Agudo-Arroyo**, 2019).

3. Marco teórico

El término *engagement* se utiliza con frecuencia en el mundo de la comunicación y el marketing. De acuerdo con **Ballesteros-Herencia** (2019), este término anglosajón suele preferirse a algunos intentos de traducción que incluyen palabras como compromiso, implicación, involucración, vinculación, pasión, entusiasmo, esfuerzo, energía e interacción. En cualquier caso, todos ellos reflejan un estado emocional (**Van-Doorn** *et al*., 2010) que un individuo puede sentir en relación con una entidad determinada (marca, organización, otros usuarios…), y que se traducirá en una serie de percepciones, actitudes y comportamientos favorables hacia la misma (**Dijkmans**; **Kerkhof**; **Beukeboom**, 2015; **Hollebeek**, 2011a; 2011b). En este trabajo, nos centraremos en la parte comportamental y que en *Twitter* puede reflejarse en los likes y retweets conseguidos por el mensaje (**Ballesteros-Herencia**, 2019; **Carrasco-Polaino**; **Villar-Cirujano**; **Martín-Cárdaba**, 2019; **Leek**; **Houghton**; **Canning**, 2019). Si bien podemos considerar ambos comportamientos como tipos de interacciones (**Wang**; **Yang**, 2020), retweetear un mensaje supone un acto de "influencia" mientras que darle al "me gusta" sería más una manifestación de sentimiento o "intimidad" (**Haven**, 2007). Un mayor nivel de interacción se conseguiría, por ejemplo, al añadir comentarios, dimensión no contemplada en el trabajo.

En la bibliografía académica se pueden encontrar estudios que identifican algunos factores determinantes del *engagement* en *Twitter*. Algunos de estos trabajos analizan los tweets publicados en torno a temáticas o hashtags concretos, tales como atentados y ataques terroristas (**Lee** *et al*., 2021; **Sutton** *et al*., 2015) o el Covid-19 (**Pulido-Polo**; **Hernández-Santaolalla**; **Lozano-González**, 2021). Frente a esta perspectiva, otros estudios se han centrado en los tweets emitidos por cuentas concretas en sectores tan diversos como la política (**Heiss**; **Schmuck**; **Matthes**, 2019; **Sahly**; **Shao**; **Kwon**, 2019), la automoción (**Li**; **Xie**, 2020; **Matosas-López**; **Romero-Ania**, 2021) o los negocios dirigidos a empresas, también llamados *business-to-business* (**Deng** *et al*., 2021; **McShane**; **Pancer**; **Poole**, 2019). En la mayoría se recurre a las métricas de likes y retweets como variables dependientes y que en ocasiones se combinan dentro de medidas globales de *engagement* (**Matosas-López**; **Romero-Ania**, 2021).

> Los seguidores de cuentas de carácter militar tienen elevadas tasas de interacción

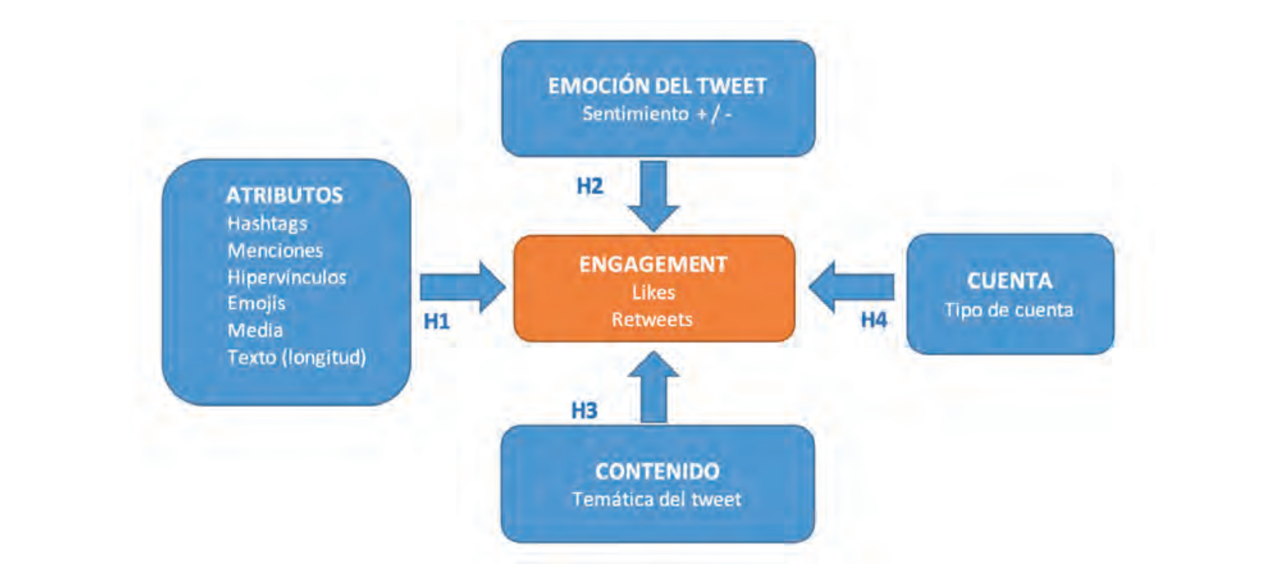

Figura 1. Modelo sobre la efectividad de las comunicaciones en *Twitter*

Detrás del comportamiento hacia los tweets puede haber factores tanto de tipo emocional como cognoscitivo, tanto relacionados con el mensaje como con la propia cuenta y sector (**Deng** *et al*., 2021; **Heiss**; **Schmuck**; **Matthes**, 2019; **Oliveira** *et al*., 2022). Sobre esta premisa, se plantea un modelo para intentar predecir el *engagement* general de los tweets, con las *FAS* y *FCSE* como contexto de investigación. Dentro de los factores explicativos se incluyen atributos generales del mensaje (hashtags, menciones, hipervínculos, emojis, elementos audiovisuales y extensión del texto), el sentimiento del mensaje (positivo *vs.* negativo), la temática del tweet y las características de la cuenta.

Factores generales

Dentro de las redes sociales, las etiquetas o hashtags son probablemente los elementos más útiles para ayudar a los usuarios en la búsqueda de información sobre tendencias, movimientos sociales y noticias de actualidad (**Lovejoy**; **Waters**; **Saxton**, 2012; **Wang**; **Liu**; **Gao**, 2016). El uso de estos elementos puede promover la interacción con los tweets, llevando a un mayor número de likes y retweets (**Oliveira** *et al*., 2022). Asimismo, las menciones a otras cuentas y los hipervínculos también pueden generar experiencias interactivas que mejoren la efectividad de los mensajes, tal y como confirmaron **Huang**, **Wu** y **Hou** (2017) en un análisis de los tweets de cuerpos policiales.

Un tipo de contenido que también puede ayudar a la efectividad comunicativa son los emojis. Las organizaciones han incorporado estos elementos a su lenguaje, consiguiendo que los mensajes reciban más likes y retweets y puedan encajar con su audiencia (**Li** *et al*., 2018; **McShane** *et al*., 2021). No solamente ayudan a la comprensión de la información, reduciendo la ambigüedad, sino que también permiten una mayor conexión con los interlocutores (**Li** *et al*., 2018; 2019).

Los estudios previos indican que los usuarios parecen mostrar un mayor interés hacia las publicaciones que contienen imágenes, vídeos u otros elementos audiovisuales (**McShane** *et al*., 2021; **Xu**; **Fedorowicz**; **Williams**, 2019). Aunque la reacción hacia una imagen puede variar en función de la temática concreta y de la calidad gráfica, el mero hecho de incluir este recurso predispone favorablemente a los usuarios (**Li**; **Xie**, 2020).

Por último, dentro este último bloque de elementos generales resulta esperable que los tweets más largos lleven a un menor *engagement* que los tweets más concisos (**Deng** *et al*., 2021). La longitud de los mensajes suele verse como un indicador de dificultad de lectura (**Daga** *et al*., 2020; **McShane** *et al*., 2021), por lo que los tweets con poco texto podrían proporcionar una mejor experiencia lectora y redundar en una actitud más favorable. Así, se propone:

> H1: El *engagement* es mayor en tweets que contienen hashtags (a), menciones a otras cuentas (b), URLs (c), emojis (d), fotos (e), elementos animados (f) y texto breve (g).

El éxito de un tweet depende del efecto conjunto de distintos atributos de carácter racional y emocional (**Kapoor** *et al*., 2021; **Lovejoy**; **Waters**; **Saxton**, 2012; **Wajiz** *et al*., 2021). Esta emoción puede ser consecuencia de diferentes elementos, tal como los emojis (**Li** *et al*., 2018, 2019) o los signos de exclamación y de interrogación en el texto (**Li** *et al*., 2018; **Teh** *et al*., 2015). También puede surgir de la utilización de cualquier otra palabra o término concreto que conlleve sentimientos positivos o negativos.

Un aspecto importante es analizar cuál es el efecto que el sentimiento inherente al texto del tweet puede tener en el *engagement*, dependiendo de que la valencia o reacción emocional sea positiva o negativa. En esta línea, **Tsugawa** y **Ohsaki** (2017) encontraron que los tweets que evocan negatividad tienen una difusión un 25% más rápida que el resto de los tweets. Sin embargo, cabría esperar el efecto contrario si nos centramos en los "me gusta". Por otra parte, algunos autores afirman que el efecto de las emociones depende del contexto específico del mensaje (**Araujo**; **Kollat**, 2018; **Tellis** *et al*., 2019).

Considerando el *engagement* general, podemos pensar que dentro del contexto de estudio los mensajes positivos podrían ser más efectivos que los mensajes negativos. En un entorno donde los ciudadanos buscan seguridad, y están en una posición de indefensión, la comunicación de un mensaje positivo puede conllevar una actitud más favorable y contribuir al éxito del mensaje. Por tanto:

> H2: El *engagement* es mayor en tweets que evocan un sentimiento positivo (a) y es menor cuando el sentimiento es negativo (b).

Factores específicos

En *Twitter* los usuarios suelen conversar sobre temas que descubren en otros medios de comunicación (**Kwak** *et al*., 2010), así como sobre las organizaciones y sus productos (**Liu**; **Burns**; **Hou**, 2017). El hecho de que una persona siga una cuenta concreta es evidentemente un indicador de que esa cuenta le resulta atractiva, de tal manera que los temas alineados con la misión y valores del emisor podrían obtener una respuesta más positiva en términos de *engagement*. En cierta manera, esta premisa también ha sido observada en el mundo de la publicidad, donde los mensajes que encajan con el tipo de producto ofrecido suelen ser más efectivos (**Lim**; **Lee**; **Pedersen**, 2013).

Como afirman **Moreno-Mercado** y **Jiménez-Cabello** (2019) para el caso de las *FAS*, aunque también podríamos aplicarlo a las *FCSE*, para el desarrollo de políticas adecuadas de seguridad y defensa resulta fundamental alinearse con la opinión pública a través de un uso adecuado de los medios. En concreto, tanto las *FAS* como las *FCSE* comparten la misión de ser un servicio público para la protección y defensa de España. Autores como **Rodríguez-Andrés** y **López-García** (2019) muestran que generar una imagen positiva, especialmente en el ámbito de protección de los ciudadanos, es uno de los objetivos principales de las publicaciones en redes sociales de los cuerpos policiales. Por otra parte, al igual que en las *FAS*, la enseña nacional es un símbolo de unión ente los cuerpos policiales estatales (**Eiroa-Escalada**; **Toribio-Castro**, 2017). De esta manera, se espera que los tweets que enfatizan la labor de seguridad/defensa, la vocación de servicio y la idea de España o sus símbolos podrían generar mayor implicación.

> H3: El *engagement* es mayor cuando la temática del tweet se corresponde con la temática de la cuenta, a saber, seguridad (a), servicio (b) y España (c) en el caso de las *FAS* y las *FCSE*.

Por último, resulta factible que las cuentas que se dirigen a un público más reducido podrían conseguir un mayor *engagement* que aquellas cuyo target es más amplio. Más que referirnos exclusivamente al número de seguidores, que en *Twitter* implica conseguir más likes y retweets (**Heiss**; **Schmuck**; **Matthes**, 2019; **Zhang**; **Jansen**; **Chowdhury**, 2011), nos referimos a que estén dirigidas a un público más o menos uniforme. Cuando una comunidad online es grande y heterogénea resulta probable encontrar individuos que se impliquen poco con la misma (**Khan**; **Bilal**; **Ahmad**, 2020). Por ende, aunque la comunidad en *Twitter* de las *FAS* es más reducida que la de las *FCSE*, el *Ejército* debería de contar con un menor porcentaje de seguidores pasivos. Así, se propone:

> H4: El *engagement* es mayor con los tweets publicados por las cuentas de las *FAS* que con los publicados por las *FCSE*.

4. Metodología

Dado su potencial para automatizar el tratamiento de grandes volúmenes de datos, la obtención de información y la generación de las variables del estudio se realizó principalmente a través de códigos estandarizados (librerías) y códigos *ad hoc* escritos en *Python* (**Daga** *et al*., 2020). Para los análisis estadísticos de los datos procesados se recurrió al programa *IBM SPSS Statistics*, ampliamente utilizado en investigación de mercados. La figura 2 resume los métodos y procedimientos utilizados, los cuales iremos describiendo en los siguientes apartados.

Figura 2. Metodología de trabajo y procedimientos de análisis

Población de cuentas

Para la realización de la investigación se seleccionaron las cuentas principales en *Twitter* del *Ejército de Tierra* (@EjercitoTierra), *Ejército del Aire* (@EjercitoAire), *Armada* (@Armada_esp), *UME* (@UMEgob), *Guardia Civil* (@guardiacivil) y *Policía Nacional* (@policia). Aunque las *FAS* gestionan alrededor de 30 cuentas oficiales vinculadas a sus principales organismos (*Ministerio de Defensa*, *Estado Mayor de la Defensa*, *Subdirección General de Reclutamiento*, etc.), se considera que las cuentas seleccionadas representan adecuadamente su estructura orgánica. En este sentido, se descartan para el estudio las cuentas de las *FAS* y las *FCSE* muy generales o dirigidas a otro perfil de audiencias, tal y como sucede con las cuentas en inglés del *Ejército del Aire* (@SpainAirForce) y de la *Policía Nacional* (@SpanishPolice) o con el *Grupo de Delitos Telemáticos* de la *Guardia Civil* (@GDTGuardiaCivil).

Selección de la muestra

Para la descarga de los tweets se utilizó *Python 3.9* y la librería *tweepy*, la cual permite acceder a la API de *Twitter* para facilitar la obtención automatizada de información desde sus servidores. Mediante esta utilidad se recuperó una muestra inicial de 14.656 tweets originales publicados entre septiembre de 2019 y noviembre de 2021, sin que se detectaran duplicados o retweets. Debido a las restricciones de la propia API, no se descargaron tweets anteriores a este periodo.

Dado que el objeto de análisis eran las publicaciones en castellano, se procedió a identificar el idioma utilizado en cada uno de los tweets mediante la librería *spacy-language-detection* (**Singh**; **Gobinath**, 2020). Con este procedimiento se encontraron 73 tweets escritos en inglés y 13 en otras lenguas incluyendo catalán, gallego, portugués, italiano y polaco. También se identificaron 30 tweets vacíos de contenido, incluyendo tan solo enlaces o menciones a otras cuentas. Todos ellos fueron eliminados de la base de datos, de modo que la base depurada quedó conformada por 14.540 tweets con la distribución que se indica en la tabla 1.

Tabla 1. Muestra de tweets utilizados

Cuenta	Total tweets	
	N	%
Tierra	2.709	18,6
Aire	1.898	13,1
Armada	2.637	18,1
UME	1.326	9,1
Guardia Civil	3.111	21,4
Policía Nacional	2.859	19,7
Total	14.540	100

Medición de las variables

Las variables objeto de estudio fueron computadas mediante una combinación de técnicas entre las que se incluyen dos de las más utilizadas en la investigación en *Twitter*, el análisis de contenido, para el recuento de atributos, y el análisis del sentimiento, con el fin de calcular la valencia emocional de los tweets (**Karami** *et al*., 2020).

La búsqueda de hashtags, menciones, hipervínculos y emojis se realizó mediante distintas fórmulas de texto de *Excel* y códigos escritos en el lenguaje *Visual Basic for Applications* (*VBA*). Para identificar la presencia de elementos audiovisuales el procedimiento consistió en un análisis automatizado de los hipervínculos del tweet. Además de empezar por "https://twitter.com/", las fotos de los tweets dirigen a un enlace con el término "/photo/", mientras que en los elementos animados (vídeos, gifs, broadcasts…) aparece "/i/" en la dirección. Dado que *Twitter* transforma las URLs a una forma abreviada (ej. https://t.co/Ra5wV6H9In), se tuvo que recurrir a un código *Python* diseñado *ad hoc* para conocer la URL completa. Cabe destacar que, de los 17.205 hipervínculos examinados, el procedimiento automatizado extrajo correctamente la forma extendida de 16.601, el 96,5%. Aparte de los vídeos y otros elementos animados incrustados en el propio tweet, también se consideraron los enlaces a vídeos de *YouTube*.

La asignación de los tweets a las categorías temáticas se realizó en *Excel* mediante una búsqueda de términos relativos a cada categoría tanto en los hashtags como en el texto general del tweet. Estos términos podían ser sustantivos (ej. defensa, virus), formas verbales (ej. protegiendo, protegen), palabras compuestas (ej. himno nacional, vocación de servicio) o raíces de palabras (ej. defend, luch). En un primer bloque temático se incluyeron los tweets con términos relacionados con la seguridad y defensa (ej. #NuestraMisionTuLibertad, #TrabajamosParaProtegerte, protección, cuidado, vigilancia, lucha). En la categoría de "servicio" entraron tweets con palabras que transmiten la idea de apoyo o compromiso con la ciudadanía (ej. #servicio, #EstamosPorTi, #24Siete, espíritu de servicio, te ayudamos). En la última categoría se incluyeron los tweets que aludían a España directa o indirectamente (ej. nuestra nación, nuestro país), sus principales símbolos (bandera, himno, escudo) y actos patrióticos (ej. jura de bandera). Dentro de esta categoría también se añadieron los items que mostraban el emoji de la bandera española.

Para ejecutar el análisis del sentimiento se empleó *pysentimiento*, una librería de *Python* creada en 2021. Sobre librerías alternativas, como *Vader* o *TextBlob*, *pysentimiento* tiene la gran ventaja de que puede utilizarse con textos en español. No solo detecta el grado de sentimiento positivo, negativo y neutral de un mensaje, sino que también incorpora funciones de preprocesado del texto y permite hacer predicciones sobre emociones concretas del mensaje, tal como alegría u odio (**Pérez**; **Giudici**; **Luque**, 2021).

Con respecto a la variable dependiente principal, el *engagement*, la métrica que se utiliza es la relación entre el número de likes y retweets de un mensaje particular y el número total de seguidores de la cuenta (**Carrasco-Polaino**; **Villar-Cirujano**; **Martín-Cárdaba**, 2019). Dado que no se dispone de la cifra de seguidores en el momento de publicación de cada tweet, la métrica empleada corresponde a la fecha de extracción de los datos.

5. Resultados

Análisis descriptivo

Como podemos ver en la tabla 2, las seis cuentas analizadas recurren de manera similar a elementos como hashtags, que aparecerían en el 90% de los tweets. Junto con los hashtags, los elementos más frecuentes son los emojis y las fotos, siendo ambos utilizados en la mayoría de los tweets del *Ejército de Tierra*, la *Armada* y la *Policía Nacional*. Las menciones o alusiones a otras cuentas también se emplean habitualmente, con una media porcentual próxima al 30%, mientras que el uso de recursos animados oscila entre el 0,8% (*UME*) y el 3,5% (*Ejército del Aire*).

Ante la dispersión de los datos, las variables cuantitativas recogidas en la tabla 2 se resumen por su mediana. La longitud de los tweets estaría en torno a 231 caracteres, con valores muy similares entre las cuentas. En el caso de los sentimientos, los tweets más positivos corresponden a los de las *Fuerzas Armadas*, siendo el mayor valor el conseguido por el *Ejército de Tierra* (0,908) y el menor el de la *Guardia Civil* (0,008). En cuanto al sentimiento negativo, los datos son muy similares, siendo ligeramente superior en la *Armada* (0,002).

En lo que concierne a las temáticas, las alusiones a España aparecen en más del 70% de los tweets del *Ejército de Tierra* y la *Armada*, siento también una opción predominante en el *Ejército del Aire*. Las referencias a la seguridad o defensa también son típicas en muchos de los tweets de la *Armada* (40,5%) y en un porcentaje superior al 20% de los tweets publicados por la *Guardia Civil* y la *Policía Nacional*. De las tres categorías analizadas, la vocación de servicio sería la opción con menos peso en términos relativos.

Si nos centramos en los datos sobre la efectividad de las cuentas, podemos comprobar que la institución más exitosa en cuanto a número de seguidores es la *Policía Nacional*, con una comunidad que supera los 3 millones de personas. En cualquier caso, los datos del número de likes y retweets no parecen ser proporcionales al peso de su comunidad, lo que hace que el *engagement* sea menor que el de otras cuentas. Así, el *engagement* mayor lo consiguen los tweets del *Ejército de Tierra* (0,162), cerca del logrado por la *UME* (0,139) y la *Armada* (0,118).

Tabla 2. Características de los tweets y métricas de efectividad

	Ejército de Tierra	***Ejército del Aire***	***Armada***	***UME***	***Guardia Civil***	***Policía Nacional***
Características de los tweets						
Hashtags (%)	91,3%	90,3%	91,5%	92,4%	89,0%	88,9%
Menciones (%)	28,7%	27,5%	26,5%	30,0%	29,4%	31,9%
URLs (%)	26,5%	28,3%	27,4%	34,4%	25,2%	25,0%
Emojis (%)	70,2%	62,2%	78,1%	64,3%	57,8%	78,8%
Fotos (%)	70,5%	63,7%	71,3%	58,4%	72,6%	71,1%
Animaciones (%)	2,7%	3,5%	1,9%	0,8%	1,2%	1,6%
Longitud (Me)	235	230	236	232	226	227
Seguridad (%)	7,5%	7,7%	40,5%	11,0%	26,8%	20,1%
Servicio (%)	5,2%	3,8%	10,4%	5,4%	14,2%	14,8%
España (%)	70,9%	29,5%	76,6%	6,0%	4,4%	6,2%
Sentimiento + (Me)	0,908	0,481	0,784	0,678	0,008	0,022
Sentimiento - (Me)	0,001	0,001	0,002	0,001	0,001	0,001
Efectividad de la cuenta						
Seguidores (N)	204.545	173.741	172.698	162.155	1.765.333	3.573.458
Likes (Me)	282	101	171	186,5	270	299
Retweets (Me)	48	17	32	35	64	51
Engagement (Me)	0,162	0,069	0,118	0,139	0,020	0,010

Nota. Me: mediana, N: número total

Modelo *logit*

Dado que los factores que influyen en el éxito de un tweet son de múltiple naturaleza, se intentó predecir la posibilidad de que un tweet concreto genere *engagement* o no lo genere, más que predecir la variable en su forma original. Así, una vez recodificada la variable de *engagement*, se procedió a la estimación de un modelo *logit* o modelo de regresión logística con el programa *IBM SPSS Statistics* (versión 22). Este tipo de regresión puede representarse por la siguiente expresión, en la que la probabilidad de que la variable dependiente adquiera el valor 1 dependerá de una matriz de variables explicativas X (**Hair** *et al*., 1999):

$$p(Y=1) = \frac{e\beta' X}{1 + e\beta' X}$$

La variable dependiente fue construida a partir de los valores de la media y desviación típica mediante un procedimiento que elimina los valores intermedios (**Hayes**, 2013). Así, se crearon dos grupos definidos como de *engagement* alto (*M* + 0,25 x DT) y *engagement* bajo (*M* - 0,25 x DT). Como variables independientes principales se consideraron tres variables cuantitativas (sentimiento positivo, sentimiento negativo, longitud del tweet) y once variables dicotómicas (hashtags, menciones, URLs, emojis, fotos, animaciones, seguridad, servicio, España, *FAS*, *UME*). El modelo también incorpora una constante y la antigüedad del tweet, en número de días, como variable de control.

> Los tweets con una polaridad positiva llevan a mayores niveles de *engagement* en las cuentas de las *Fuerzas Armadas* y cuerpos policiales

Cabe destacar que en el modelo se estima de manera independiente el efecto de la *UME* del resto de cuentas de las *FAS*, representándose con dos variables independientes. Así, se pretende medir con mayor precisión la respuesta hacia los tweets en función de que las cuentas tengan un enfoque más general o específico.

Los resultados de la estimación mostraron que el modelo propuesto resulta estadísticamente válido para predecir el *engagement* de los tweets. En concreto, la prueba ómnibus resultó significativa al 99% de confianza (χ^2=5.411,728; p<0,001), lo que confirma la validez predictiva del modelo. El porcentaje de clasificación correcta resultó bastante alto, del 93%, lo que también se refleja en unos coeficientes explicativos adecuados según los parámetros de Cox y Snell (R^2=0,522) y Nagelkerke (R^2=0,766) (**Hair** *et al.*, 1999). En la tabla 3 podemos ver los resultados obtenidos en la estimación del modelo. Tanto la constante como la variable de control ejercen efectos significativos al 99% de confianza (p<0,001).

En línea con la primera hipótesis, el *engagement* depende significativamente de la existencia de URLs (β=4,369; p<0,001), fotografías (β=3,764; p<0,001) y, en menor medida, emojis (β=0,812; p<0,001), lo que confirmaría H1c, H1d y H1e. Ahora bien, las demás variables contempladas en esta hipótesis inicial no tienen efectos significativos.

En cuanto a los sentimientos, los datos validan parcialmente las hipótesis H2a y H2b. Así, los tweets que evocan un sentimiento positivo consiguen un mayor *engagement* (β=0,800; p<0,001) que los tweets que despiertan negatividad (β=0,665; p=0,019), aunque en ambos casos el efecto tiene la misma dirección. Una mayor valencia emocional, positiva o negativa, conlleva una mayor implicación con el mensaje.

En relación con H3c, las alusiones a España y a sus símbolos aumentan el *engagement* de los tweets (β=1,587; p<0,001). Sin embargo, no se detectan efectos significativos para las categorías restantes (p>0,05). Y respecto a H4, los datos indican que los tweets de las cuentas principales del *Ejército de Tierra* consiguen un *engagement* mayor que los publicados por otras cuentas (β=1,344; p<0,001), si bien en los tweets de la *UME* el efecto es de signo contrario (β=-4,419; p<0,001).

Tabla 3. Resultados de la estimación del modelo *logit*

	β	Error estándar	Wald	p-valor	Exp (β)	95% C.I. para Exp(β)	
						Inferior	**Superior**
Factores generales							
Hashtags (H1a)	0,103	0,159	0,425	0,514	1,109	0,813	1,513
Menciones (H1b)	-0,174	0,102	2,939	0,086	0,840	0,688	1,025
URLs (H1c)	4,369	0,318	189,085	<0,001	78,936	42,349	147,129
Emojis (H1d)	0,812	0,115	49,975	<0,001	2,252	1,798	2,820
Fotos (H1e)	3,764	0,311	146,392	<0,001	43,133	23,441	79,365
Animaciones (H1f)	-12,267	16.090,212	0,000	0,999	0,000	0,000	
Longitud (H1g)	0,001	0,001	1,736	0,188	1,001	0,999	1,003
Sentimiento + (H2a)	0,800	0,110	52,437	<0,001	2,226	1,792	2,764
Sentimiento - (H2b)	0,665	0,284	5,492	0,019	1,944	1,115	3,388
Factores específicos							
Seguridad (H3a)	0,242	0,149	2,627	0,105	1,274	0,951	1,708
Servicio (H3b)	0,356	0,197	3,257	0,071	1,428	0,970	2,103
España (H3c)	1,587	0,122	168,578	<0,001	4,887	3,846	6,210
*FAS** (H4)	1,344	0,147	83,943	<0,001	3,835	2,877	5,113
UME (H4)	-4,419	0,158	786,326	<0,001	0,012	0,009	0,016
Otros factores							
Días	0,002	0,000	37,761	<0,001	1,002	1,001	1,002
Constante	-5,548	0,412	181,588	<0,001	0,004		

*No incluye la cuenta de la *UME*

Para poder entender mejor la respuesta de los usuarios hacia los tweets publicados por cada cuenta, en la tabla 4 se muestran los resultados de un análisis adicional. En concreto, mediante la prueba no paramétrica de Mann-Whitney se estudia la posible existencia de diferencias significativas entre likes, retweets y *engagement* total en función del tema analizado (seguridad, servicio, España, otros) y de que las cuentas correspondan a los principales componentes de las *FAS* (*Ejército de Tierra*, *Ejército del Aire*, *Armada*), al cuerpo específico de la *UME* o a las *FCSE*. Para este análisis se excluyen los tweets asignados a más de una categoría, siendo la muestra final de 14.540 tweets.

Tabla 4. *Engagement* por categorías temáticas y tipos de cuentas

	Categorías (mediana)				**Prueba de Mann-Whitney (Z)**		
	Seguridad	**Servicio**	**España**	**Otros**	**Seg/Otr**	**Ser/Otr**	**Esp/Otr**
Cuentas militares generales (*Ejército de Tierra*, *Ejército del Aire*, *Armada*)							
Likes	183	247	246	139	12,08**	11,62**	23,29**
Retweets	34	43	42	25	12,47**	11,85**	22,49**
Engagement	0,122	0,159	0,150	0,089	13,69**	11,96**	22,40**
Cuenta militar de la *UME*							
Likes	214	183	303	176	1,78	0,00	2,79**
Retweets	43	31	44	34	2,09*	0,80	2,13*
Engagement	0,159	0,133	0,214	0,133	1,81	0,15	2,68**
Cuentas de las *FCSE* (*Guardia Civil*, *Policía Nacional*)							
Likes	267	352	319	279	1,01	5,09**	1,70
Retweets	50	54	55	64	9,32**	4,37**	2,67**
Engagement	0,014	0,015	0,013	0,014	1,64	1,50	0,58

* p ≤0,05 ** p ≤0,01

Tal y como muestra la tabla 4, los tweets del *Ejército de Tierra*, la *Armada* y el *Ejército del Aire* tienen una mayor efectividad cuando los temas aluden a la seguridad, al servicio o a España. En todos los casos las diferencias son estadísticamente significativas al 99% de confianza, si bien se observa que el tema de la seguridad tiene un menor impacto en el número de likes, retweets y *engagement* general que el de las otras dos categorías.

En lo referente a la *UME* podemos observar que los efectos más positivos en número de likes y *engagement* total se producen cuando en los tweets se alude a la nación española (p<0,01), aunque para aumentar los retweets también se consigue un efecto similar con contenidos sobre seguridad (p<0,05).

Por último, en las cuentas de las *FCSE* encontramos una respuesta dispar en función de la métrica utilizada. En general, los tweets que enfatizan la idea de servicio consiguen un mayor número de likes que los que evocan la seguridad o España. Sin embargo, los usuarios parecen retweetear más los mensajes centrados en temas distintos. En ambos casos, likes y retweets, las diferencias detectadas son al 99% de confianza.

6. Discusión y conclusiones

Desde los primeros sondeos, en 1987, la *Guardia Civil*, la *Policía* y el *Ejército de Tierra* han sido las únicas instituciones en España que nunca han suspendido en valoración popular (**Rodríguez-Andrés**; **López-García**, 2019). Este apoyo también parece plasmarse en las redes sociales, de tal manera que todas estas instituciones son muy exitosas en términos de seguidores. Las *FAS* cuentan con una comunidad menor que las *FCSE*, aunque dicha comunidad podría estar interactuando más con los contenidos publicados.

En general, se observa que la mera presencia de hashtags y menciones no influye significativamente sobre la efectividad de los tweets, lo que sí consiguen los hipervínculos a contenidos externos. Tanto los emojis como las fotografías también ejercen un efecto claro en el *engagement*, lo que no consiguen otro tipo de animaciones. Y, por otro lado, el que los tweets tengan más o menos texto tampoco parece ser relevante para los usuarios. Los resultados sugieren que el efecto de estas variables generales podría depender de los contenidos específicos del tweet y del sector o contexto examinado, tal y como afirman algunos autores (**Araujo**; **Kollat**, 2018; **McShane** *et al*., 2021).

Confirmando las expectativas, que el mensaje genere un sentimiento positivo también conlleva un mayor *engagement* que cuando el sentimiento es negativo. Sin embargo, tanto los tweets con valencia positiva como negativa promueven la interacción con los mensajes de las *FAS* y *FCSE*, lo que confirma la tesis de que las emociones, sobre todo en algunos contextos, son fundamentales para entender el comportamiento de los individuos (**Tellis** *et al*., 2019).

En relación con las categorías temáticas, las referencias a España y sus símbolos consiguen generar los mayores niveles de *engagement*, sobre todo para las *FAS*. Los tweets que resaltan la vocación de servicio tendrían un mayor éxito en el caso de la *Policía Nacional* y la *Guardia*

> La inclusión de hipervínculos, emojis y fotografías en los tweets está asociada a mayores niveles de *engagement*

Civil, mientras que el concepto de seguridad y defensa sería el que más favorece a los tweets de la *UME*. En síntesis, se confirma que la audiencia valora mejor los mensajes de las cuentas con una comunidad más definida, y que cuando los mensajes encajan con los valores del emisor la respuesta todavía es más positiva.

> Los tweets que mencionan a España y sus símbolos consiguen mayores niveles de *engagement* que los tweets que enfatizan la labor de seguridad y de servicio

Además de tener implicaciones académicas, los resultados obtenidos tienen implicaciones prácticas en cuanto a la gestión de las comunicaciones en *Twitter*. En esta plataforma los mensajes suelen adquirir, por lo general, un estilo más informativo que el utilizado en redes como *Facebook* (**Stone**; **Can**, 2020). Si bien este enfoque puede ser correcto, los resultados indican que la parte emocional es muy relevante para motivar a la audiencia. Despertar los sentimientos a través de emojis, fotografías, la alusión a temas con carga emocional (ej. símbolos nacionales) y el propio texto del mensaje puede animar a los usuarios a interactuar con los tweets. Por otra parte, la existencia de hipervínculos que lleven a los usuarios hacia contenidos de valor también es una estrategia que determina la efectividad de las comunicaciones en este contexto (**Lovejoy**; **Waters**; **Saxton**, 2012; **Wang**; **Zhou**, 2015). En cualquier caso, es importante que los mensajes sean relevantes desde el punto de vista del contenido, ya que abusar de elementos como los hashtags o las URLs podría incrementar la complejidad visual de la información y llevar al efecto opuesto (**Deng** *et al*., 2021).

Este trabajo no está exento de limitaciones, lo que abre la puerta a futuras investigaciones que corroboren o amplíen los resultados. En especial, resultaría recomendable introducir una perspectiva cualitativa en el análisis, de forma que mediante metodologías como entrevistas en profundidad dirigidas a los responsables de las cuentas o dinámicas de grupo con los seguidores, pudieran identificarse otros temas o elementos de relevancia. Por ejemplo, un aspecto de interés sería averiguar cómo la irrupción del Covid-19 ha cambiado las percepciones sobre las *FAS* y las *FCSE*, y cómo se han trasladado dichas percepciones al *engagement* en redes sociales. Si ha prevalecido una imagen coercitiva, que es la que pudo seguir a la declaración del estado de alarma (**López-García**, 2020) o, por el contrario, estas instituciones han salido fortalecidas de la pandemia y en qué manera. De igual forma, el estallido de la guerra entre Rusia y Ucrania, en febrero de 2021, podría tener repercusiones a nivel global en las percepciones sobre los ejércitos y la importancia del concepto de seguridad y defensa.

La aplicación de una dimensión cualitativa en futuros trabajos también podría ser útil para determinar si las métricas de *engagement* centradas en respuestas como likes o retweets deberían reforzarse con otras medidas de tipo perceptual y actitudinal (**Hollebeek**, 2011a; 2011b). Frente a la fórmula elegida en este estudio para medir el *engagement*, también cabría la posibilidad de añadir comentarios y menciones a los likes y retweets y, en vez de los seguidores, contemplar el número de impresiones o veces a las que una persona es expuesta a un tweet en particular.

Twitter es una plataforma que se ha analizado en numerosos trabajos dada su potencialidad para la extracción y análisis de información (**McCormick** *et al*., 2017; **Zimmer**; **Proferes**, 2014). Ahora bien, el modelo propuesto debería ser replicado con los datos de otras redes como *Facebook* e *Instagram*, aparte de incorporar la perspectiva del usuario mediante un análisis de los tweets publicados por cuentas particulares. De cara a futuros análisis en esta dirección, hay que tener en cuenta que la capacidad predictiva de las herramientas utilizadas para el análisis del sentimiento se reduce cuando el lenguaje se emplea con sentido irónico. Es por ello por lo que el juicio del analista de datos siempre debe estar por encima de los resultados de cualquier algoritmo.

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Open data on Covid-19 in the Spanish autonomous communities: reutilization in spatial epidemiology studies

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Abstract

The Covid-19 pandemic has highlighted the need for governments and health administrations at all levels to have an open data registry that facilitates decision-making in the planning and management of health resources and provides information to citizens on the evolution of the epidemic. The concept of "open data" includes the possibility of reutilization by third parties. Space and time are basic dimensions used to structure and interpret the data of the variables that refer to the health status of the people themselves. Hence, the main objective of this study is to evaluate whether the autonomous communities' data files regarding Covid-19 are reusable to analyze the evolution of the disease in basic spatial and temporal analysis units at the regional and national levels. To this end, open data files containing the number of diagnosed cases of Covid-19 distributed in basic health or administrative spatial units and temporal units were selected from the portals of the Spanish autonomous communities. The presence of infection-related, demographic, and temporal variables, as well as the download format and metadata, were mainly evaluated. Whether the structure of the files was homogeneous and adequate for the application of spatial analysis techniques was also analyzed. The results reveal a lack of standardization in the collection of data in both spatial and temporal units and an absence of, or ambiguity in, the meaning of the variables owing to a lack of metadata. An inadequate structure was also found in the files of seven autonomous communities, which would require subsequent processing of the data to enable their reuse and the application of analysis and spatial modeling techniques, both when carrying out global analyses and when comparing patterns of evolution between different regions.

Keywords

Open data; Covid-19; Pandemics; Coronavirus; Reutilization of open data; Health information; Health data portals; Autonomous communities; Spain; Spatial epidemiology; Geolocation.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

1. Introduction

The term "open data" first appeared in 1995 in a paper from an American scientific agency concerning the dissemination of geophysical and environmental data, in which the authors promoted complete and open exchange of scientific information between different countries. Years later, in 2007, a group of open software activists established the concept of open data, defining public data as a common good founded on the principles of openness, participation, and collaboration (**Chignard**, 2013).

The *Open Government Working Group* recommended eight principles related to the access to and use of public data. These principles state that public data are open when the following conditions are met: (1) complete, (2) primary, (3) timely, (4) accessible, (5) machine-processable, (6) nondiscriminatory, (7) nonproprietary, and (8) unlicensed (**Dawes**, 2010).

It is important to distinguish data availability from data usability, although the goal of an open data policy should be to achieve both. Since most open data policies are enforced by legislative bodies without specific guidelines regarding how data should be published in a manner aiding public use, administrators often focus more on data availability than usability, creating a gap between data quality and system quality that makes it impossible for users to utilize the data's full potential (**Park**; **Gil-García**, 2022).

Given this concept of open data, an open data portal should provide data that can be reutilized by professionals, other data users, and the general public. Having an update mechanism, using a data management system, and providing API availability, aspects that more than half of the portals in Spain in 2021 lack, are some of the minimum characteristics that portals must meet for their data to be usable by professionals (**Abella**; **Ortiz-de-Urbina-Criado**; **De-Pablos-Heredero**, 2022).

Different models have been developed to assess the degree of open data reutilization. Meloda 5 is a metric based on various dimensions related to legal license, access to data, technical standards, standardization, content related to geolocation, frequency of updates, dissemination, and reputation (**Abella**; **Ortiz-de-Urbina-Criado**; **De-Pablos-Heredero**, 2019). Another, simpler model was developed by Tim Berners-Lee, in which the quality of data is measured by assigning five stars according to their availability (levels 1, 2, and 3) and reusability (levels 4 and 5) (**Berners-Lee**, 2009). Other requirements that the data must meet for reutilization are: integrity (completeness), accessibility and visibility, ease of use and understanding, updating, validity and usefulness, quality, and granularity (primary data) (**Lourenço**, 2015).

The expansion and effects of the Covid-19 pandemic, and the initial ignorance regarding many aspects of the infection, showed the value of having adequate and publicly available data on a suitable spatial and temporal scale to be able to utilize them advantageously for planning and modeling purposes (**Gardner** *et al*., 2021).

The *World Health Organization* (*WHO*), the *European Centre for Disease Prevention and Control* (*ECDC*), and *Johns Hopkins University* rapidly developed datasets to analyze pandemic trends and assess the risks of spread and contagion in various countries and regions around the world (**Ashofteh**; **Bravo**, 2020). At the international level, a large amount of open-format data has been provided to be utilized or reutilized by researchers in order to predict the spread of the disease and identify potentially vulnerable populations or areas (**Ball**, 2020). Many resources and open data repositories related to Covid-19 have been created by governments and institutions (**Hu** *et al*., 2020; **Pecoraro**; **Luzi**, 2021). **Alamo** *et al*. (2020) present the main datasets available on the Internet related to Covid-19 and list the most relevant institutions that submit up-to-date information, accompanied by a description of their characteristics.

In Spain, it is the autonomous communities (ACs) that manage health information in their territories and have the capacity and responsibility to publish data related to the pandemic via their specific open data portals on coronavirus (**Díez-Garrido**; **Melero-Lázaro**, 2022). CovidDATA-19 collects data on confirmed daily cases, deaths, ICU cases, and AC discharge from the Datadist data source (**Ferrer-Sapena** *et al*., 2020). The *Government of Spain*, through the *Carlos III Health Institute*, also publishes open data on the number of cases by diagnostic technique and province of residence, as well as the number of hospitalizations, ICU admissions, and deaths by sex, age, and province (*ISCIII*, 2022).

Despite the enormous effort involved in the creation of these portals, the data are used to describe the incidence in report format, visualizations, and downloads only on a province-by-province basis, but are insufficient to apply techniques with which to build spatial and temporal models that allow the prediction of the evolution of the pandemic and the analysis of the effectiveness of containment measures in more precise, homogeneous, and comparable basic units, such as municipalities or Basic Health Zones (BHZs). Therefore, it is necessary to visit the open data portals of the ACs to determine whether it is possible to reutilize Covid-19 data to which spatial analysis techniques can be applied. These techniques allow for the identification of spatial–temporal patterns that can, in turn, model or predict the propagation and incidence in spatial units with municipality or BHZ resolution (**Escolano-Utrilla**; **Salvador-Oliván**, 2022).

Some studies of the open data portals on coronavirus in the ACs have evaluated what data they contain and the download format (**Díez-Garrido**; **Melero-Lázaro**, 2022; **Martín-Fernández** *et al*., 2021), but none of them have assessed whether it is possible to reutilize them in specialized discipline research and, more specifically, in studies that seek to apply spatial analysis techniques.

The development of spatial–temporal models relating to incidence, risk, and propagation requires data that meet certain characteristics in terms of their content and form of expression. The objective of this study is thus to determine whether the portals of the ACs contain reusable Covid-19 data files to analyze the evolution of the pandemic in basic spatial and temporal analysis units, at both the AC and national levels.

2. Spatial epidemiology and health geography

Epidemiological studies aim to explain the distribution of a disease in a population by identifying people at risk, the time of onset of the disease, and their location (**Rothman**; **Greenland**; **Lash**, 2011). Geographical location has become an essential element in understanding the dynamics and evolution of an epidemic, thus spatial epidemiology has emerged as a novel approach to understanding and controlling current epidemics.

Moreover, health geography also addresses the study of spatial distribution and the incidence of diseases, but with a territorial approach; that is, the territory as a physical space and as a social construction situates it at the center of research. Hence, the thematic domains of health geography are broader than those of space epidemiology, since they also include health systems content (the distribution of health equipment, resources, services, etc.) as well as demographic, environmental, and planning content (**Souris**, 2019).

Studies of spatial epidemiology and health geography have contributed significantly to knowledge on how the Covid-19 pandemic has spread and the factors that influence its uneven incidence and social and territorial risk. Among other aspects, the research developed in this field has improved the knowledge of spatiotemporal patterns of geographical propagation and the transmission routes of the pandemic (**Franch-Pardo** *et al*., 2021) and has made it possible to identify local critical points (**Hu** *et al*., 2020) and calculate the number of new infections per case (*R* number), as well as to assess the incidence of multiple socioeconomic, demographic, environmental, and infection risk factors (**Elliott**; **Wartenberg,** 2004; **Kang** *et al.*, 2020; **Xu**; **Kraemer**, 2020; **Kobayashi** *et al*., 2021; **Paez**, 2021).

Although spatial epidemiology and health geography have different areas and objectives of investigation, they share numerous methods, techniques, data, and means of spatial and spatial –temporal analysis, since geographical space lies at the core of both disciplines (**Souris**, 2019). For data on health events –changes in the physiological or health status of individuals in a population– to be usable in these disciplines, they must include thematic as well as location information.

Most studies of spatial epidemiology and health geography apply spatial analysis procedures implemented in geographic information system (GIS) programs or similar systems that are capable of analyzing digital geographic information (**Kirby**; **Delmelle**; **Elbert**, 2017). The most widespread data model in GIS uses points, lines, polygons, pixels, and other digital objects to represent the location and shape of the real phenomena and objects (people, territories, environmental variables, etc.) under study. The location description usually follows some standard of data and metadata and is connected to the thematic information, usually presented in relational tables, by means of a geocode. Spatial information is considered to be part of the public infrastructure, maintained by institutions dedicated specifically to the creation and dissemination of geographical information (*Ministry of Transport, Mobility, and Urban Agenda*, date unknown).

Data regarding health events are taken from individuals whose location can be registered. Individual data allow for the reconstruction of trajectories and behaviors in great detail and in local contexts, but are available only in rare circumstances. Individual data on health events are normally published by aggregating the information into spatial units with the highest possible resolution. In turn, these units can merge into larger ones –often resulting in a loss of spatial resolution– depending on the objectives of each study or the spatial scope of health planning. From a practical point of view, it is advisable that the data refer to specific spatial units, such as BHZs, Health Areas, or others, or administrative units (census sections, districts, or municipalities) represented by their geocode and whose spatial information is updated and accessible. This option also facilitates the use of other (demographic, socioeconomic, and environmental) information referring to these same spatial units.

3. Methods

Data sources

The Spanish autonomous communities' open data portals on coronavirus were used as analysis units. These portals were selected because their objective is to disseminate datasets in reusable formats so that other citizens and researchers can also use them (**García-García**; **Curto-Rodríguez**, 2018).

They were located through a Google search using the terms "open data," "coronavirus," and the name of the autonomous community, and the website of the open data portal of each AC was accessed during the month of May 2022.

These portals contain multiple Covid-19 data files, so only those that met the following inclusion criteria, suitable to address the objective of this study, were selected:

- Files with data on diagnosed cases of Covid-19 in BHZs (districts or health centers) or administrative units (municipalities, counties, or provinces).
- Files with data on diagnosed cases of Covid-19 in temporal units (data collected in days, weeks, or different periods or waves of the pandemic).

The reason for having information with high spatial and temporal resolution is due to its strategic value for the management of health resources and for the adoption of measures to control the pandemic at the local level at which health systems operate.

When some ACs did not have files that met the two inclusion criteria, those that met either of them were selected.

The following exclusion criteria were applied:

- Files with global data for the entire AC, not disaggregated into spatial units.
- Files with final cumulative data exclusively, or only with figures from the last 7 or 14 days.

Variables and data extraction

On the basis of the *Meloda 5* metric for the reutilization of open datasets (**Abella**; **Ortiz-de-Urbina-Criado**; **De-Pablos-Heredero**, 2019) and variables used to obtain epidemiological models (**Alamo** *et al*., 2020), the variables necessary to analyze and spatially represent the spatial–temporal evolution and situation of the pandemic in basic spatial units were selected.

The variables were classified into six categories:

(1) portal identification data;

(2) geographical variables, of crucial importance since the place where an individual lives is considered to be a potential determinant of morbidity and mortality (**Diez-Roux**, 2001);

(3) data on Covid-19 infections;

(4) temporal variables;

(5) demographic variables, also important to determine the density and demographic and socioeconomic structures of the population since they have been recognized as a risk factor in the transmission of the disease and in the incidence rate (**Priyadarsini**; **Suresh**, 2020; **Sy** *et al*., 2021); and

(6) other variables, such as the download format or the existence of metadata that facilitate the interpretation of the data in the portals.

Of the files downloaded from the ACs that met the inclusion criteria, the presence or absence of the variables were evaluated and the data were collected in an Excel file. The structure of the open data files was also evaluated to determine whether they were appropriate for the application of spatial–statistical procedures. Virtually all geographic information systems use a "list" data structure for the analysis of spatiotemporal data, which has at least three columns:

- one that registers the codes of the spatial units (which are repeated for each time measurement);
- another that records the measurements of the time variable (expressed in appropriate units and format);
- and a third that contains the values of the variable of interest (the phenomenon studied).

Data in table form, with spatial units in rows and temporal units in columns, can be used for synchronous analysis and can also be transformed into "list" format by means of a transposition operation. For this reason, the selected files were classified into three types:

- adequate structure if each row contained an identifiable territorial unit (municipality, health district, or BHZ) and its number of cases according to a temporal distribution (days or weeks);
- inadequate structure, but that can be reutilized with data processing; and
- inadequate structure owing to a lack of essential data, i.e., where it is not possible to reutilize the data.

The complete list of selected variables and the *Excel* file are available on the *Open Science Framework* (*OSF*) at *https://osf.io/r6byj*

4. Results

4.1. General characteristics

> Open data are those that are not only shared but can be reused by third parties to carry out studies in their scientific disciplines

All the ACs, except Extremadura and the autonomous Cities of Ceuta and Melilla, offered open data files relating to the coronavirus pandemic. Of the 16 ACs, only 9 state that the license type for the use of data files is Creative Commons whenever authorship is recognized (Attribution or By), while only one, Castile–La Mancha, specifies that it must be shared as the original license.

Half of the ACs with open data present metadata that describe the meaning and content of the variables in the files, i.e., Andalusia, the Balearic Islands, the Canary Islands, Castile and Leon, Catalonia, the Valencian Community, Navarre, and the Basque Country.

All the ACs publish data in machine-readable, nonproprietary format, so there are no barriers to reutilization of the available data. The data are in csv format in all of them, while only the Balearic Islands and Catalonia offer their data in rdf format as well.

Table 1. General characteristics of the open data files of the autonomous communities

Autonomous community	Legal license	Metadata	Data format								
			rdf	csv	json	PC-axis	ods	xml	rss	tsv	*Excel*
Andalusia		✓		✓	✓	✓	✓				✓
Aragon				✓							✓
Asturias	CC BY			✓							
Balearic Islands		✓	✓	✓	✓			✓	✓	✓	
Canary Islands	CC BY	✓		✓							
Cantabria	CC BY			✓							✓
Castile–La Mancha				✓							
Castile and Leon	CC BY-SA	✓		✓	✓			✓			✓
Catalonia	CC BY	✓	✓	✓				✓	✓	✓	
Valencian Community		✓		✓	✓			✓		✓	
Galicia	CC BY			✓							
La Rioja				✓	✓			✓			✓
Madrid	CC BY			✓	✓						
Murcia	CC BY			✓							
Navarre		✓		✓	✓			✓		✓	✓
Basque Country		✓		✓	✓		*	✓			✓

4.2. Geographical and temporal data of the files

Table 2 summarizes the main characteristics of the file of each AC that presents a higher level of spatial and temporal granularity, declaration of cases, and completeness of the data (period of time covered).

Table 2. Characteristics of the Covid-19 data file with greater granularity and completeness in each autonomous community

Autonomous community	Spatial unit	Diagnosed cases	Temporal resolution	Period
Andalusia	Health districts	Diagnostic tests	Weeks	Complete
Aragon	BHZ	Total	Days	Complete
Asturias	Health areas	Total	Weeks	Until 12/2021
Balearic Islands	BHZ	Total	Days	Complete
Canary Islands	Municipalities	Total	Days	01/2021–03/2022
Cantabria	Municipalities	Total	No	Acute phase
	No	Total	Days	Acute phase
Castile–La Mancha	Provinces	Total	No	Acute phase
	No	Diagnostic tests	Days	Acute phase
	Municipalities	Diagnostic tests (> 60)	Two weeks	03/2022–
Castile and Leon	BHZ	Totals, diagnostic tests, and PCR	Days	Complete
Catalonia	Basic Health Area	Totals, diagnostic tests	Days	Complete
Valencian Community	Health departments	Diagnostic tests	Days	Complete
Galicia	Health areas	Total	Days	Complete
La Rioja	BHZ	Total	No	Complete
Madrid	BHZ	Total	Days/weeks	Complete
Murcia	BHZ	Total	Days	Acute phase
Navarre	BHZ	Total	Days	Acute phase
Basque Country	BHZ	Total	Days	13/05/2020–present

Andalusia provides the number of cases diagnosed by diagnostic tests for active infection (PCR and antigen tests) by health districts, with their names and *National Statistics Institute* (*INE*) codes and by weeks, from March 2020 to March 2022. As of March 2022, data for people 60 years of age or older are collected in another file (which includes data since the beginning of the pandemic). Therefore, the two files cover the entire period, and also contain the description of the included variables.

For Aragon, a data file with the total number of cases distributed daily and by Basic Health Zones from the beginning of the pandemic to the present can be downloaded. As of mid-May 2020, confirmed cases were diagnosed using PCR and antigen testing, which resulted in an increase from days prior, in which cases were only diagnosed using PCR tests. The drawback is that a file must be downloaded for each day until March 2022, after which the files are downloaded by weeks, collecting the daily data for that week. There are no metadata.

Asturias has a file with the total number of cases (although the means of diagnosis is not indicated) distributed weekly by health areas from the beginning of the pandemic until December 2021.

The Balearic Islands has a data file with the total number of cases diagnosed by PCR and antigen tests distributed by BHZ (with their geocodes) and days, according to age and sex, from the beginning of the pandemic to the present. Metadata are available.

The Canary Islands has a file with the number of cases and deaths, according to age and sex, distributed by municipalities (both residence and assigned) and days, from January 2021 to March 2022. Consequently, it does not cover the entire period of the acute phase of the pandemic. Each record corresponds to a case, and in each the sex and age group are indicated.

Cantabria does not have a single file with data disaggregated into spatial and temporal units; rather, it maintains two files: one which collects the total number of cumulative cases by municipalities, and another which has the total number of cases per day but for the whole community. In both cases, the time period runs until March 2022.

For Castile–La Mancha, there is also no single file disaggregated into spatial and temporal units; once again there are two files: one which includes the total number of final cumulative cases and deaths by province, and another which includes the number of cases confirmed by diagnostic tests distributed daily for the entire AC. Both cover the acute phase of the pandemic. Since March 2022, another data file was created with the number of cases in the last two weeks in people 60 years of age or older, distributed by municipalities.

Castile and Leon provides a file with the total number of cases and those diagnosed by diagnostic and PCR tests, distributed by days and health centers (with their GPS codes and coordinates), as well as the total number of tests performed, extending from the beginning of the pandemic to the present.

For Catalonia, there are four files with data disaggregated into spatial and temporal units. The most useful one is that which contains the total number of cases and those diagnosed by diagnostic tests (PCR and antigen tests) distributed by days in Basic Health Areas (BHAs) throughout the pandemic period to the present. Metadata are available.

The Valencian Community has a file with cases confirmed by diagnostic tests according to age and sex, distributed daily by Health Departments throughout the pandemic to date.

In Galicia, the file contains all the cases diagnosed by diagnostic tests and self-tests distributed by Health Areas, and covers the days during the entire pandemic period to the present.

La Rioja has several data files that are not downloadable, and others that lead to a 404 error page or contain inaccurate data (for example, in a number of cases “<10” appears instead of the exact value). The most useful data file is the one that collects the cumulative number of positive cases by BHZ broken down by PCR, antigen, and CLIA (ELISA/antibody test) tests, with the total number of tests performed. The beginning of the period is not specified, but it extends to the present.

> The Spanish autonomic open data portals on Covid-19 lack standardization in the data collected and a homogeneous structure, which makes it difficult to reuse

For Madrid, there are two files. One of them contains all the diagnosed cases distributed by BHZ and days until 1 July 2020; from July 2, the data are distributed by weeks until March 2022. From March to the present, cases are only recorded in people 60 years of age or older, distributed by BHZ and days.

In Murcia there are two files, one until 30 November 2020, and another from 1 December 2020 to March 2022, with the total number of cases distributed by BHZ and days.

Navarre has a file with the total number of cumulative cases distributed by BHZ and days from the beginning of the pandemic to March 2022. To determine the number of new cases per day and per BHZ, it is necessary to process the data.

In the Basque Country, there is a file that collects the total number of cases distributed by BHZ with their codes and by days, from 15 May 2020 to the present. In this file, the days are listed in the columns, unlike in the rest of the ACs, where they are listed in the rows. It contains the number of cases diagnosed by PCR, antigen tests, and antibody tests, as well as the number of tests performed, and the number of deaths, hospitalizations, and ICU cases, by age group and sex.

The highest level of territorial disaggregation is observed in the nine ACs that provide data at the BHZ scale, including Catalonia, although its denomination is different (Basic Health Area, or BHA). In Andalusia, Asturias, the Valencian Community, and Galicia, the data are aggregated in lower-resolution units, with designations specific to each community. Three ACs (Canary Islands, Cantabria, and Castile–La Mancha) do not provide data by areas of health service management, but rather administrative units such as municipalities or provinces (Fig. 1).

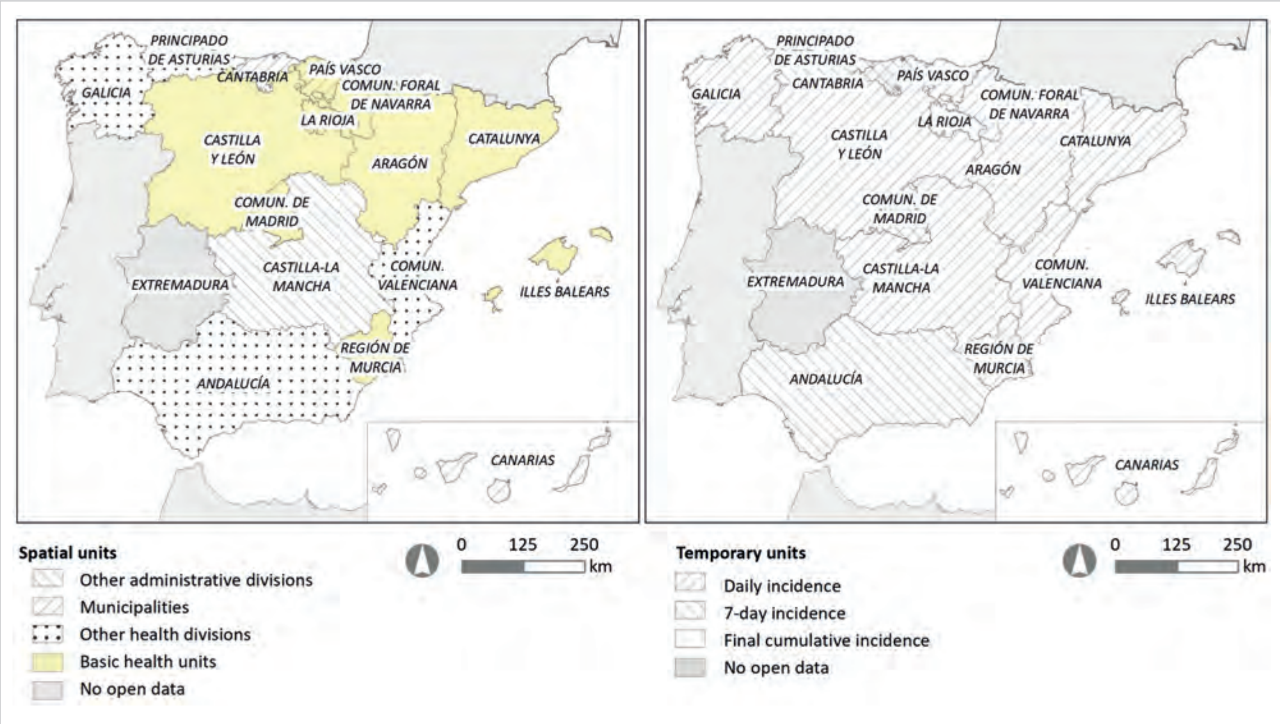

Figure 1. Representation of spatial (left) and temporal (right) units of the open data records of Covid-19 by autonomous communities

Regarding the temporal distribution, the number of cases is recorded by days in all the ACs except in Andalusia and Asturias, where it is recorded by weeks. In Castile–La Mancha, daily data are not registered by spatial units and, when they appear by weeks, the data are the total cumulative cases from the last two weeks only in those 60 years or older. In Cantabria, the data are registered in the same way; the daily data refer to the entire AC, and when the data are by municipality, they are final cumulative data. In La Rioja, the data are also not distributed in temporal units and record the final cumulative cases by BHZ (Fig. 1).

4.3. Structure of the files

Table 3 presents the structure of the files of the ACs, as well as their assessment and data processing requirements with respect to their use in applications of spatial analysis techniques and whether subsequent data processing is necessary.

Table 3. Possibility of reutilizing the autonomous communities' data files to apply spatial analysis techniques

Autonomous community	Structure	Requires data processing
Andalusia	×	Redundant information
Aragon	×	One file per day or week has to be downloaded. The variable "day" must be included in the global file
Asturias	×	The basic health areas have to be moved to rows
Balearic Islands	✓	
Canary Islands	×	Each row corresponds to a single case. Necessary to add the number of cases in a day
Cantabria	××	Data are not recorded in spatial units
Castile–La Mancha	××	Missing data
Castile and Leon	✓	
Catalonia	✓	
Valencian Community	×	Departments of Health need to be moved to rows (data transposition)
Galicia	✓	
La Rioja	××	Missing data
Madrid	✓	
Murcia	✓	
Navarre	×	Submits the number of cumulative cases for each day and BHZ. Deduction necessary to find out the number of daily cases and add them to aggregate them in weeks or other periods
Basque Country	×	Days need to be moved to rows (they are in columns)

(✓ Adequate structure;; × Requires data processing; ×× Cannot be reutilized)

Only six ACs have a file with the appropriate structure, where each row corresponds to the number of cases per BHZ and per day or other period. In five ACs, data processing is necessary to adapt the structure. Of these, the file from Andalusia presents the least difficulties, since the process simply consists of eliminating rows with redundant information (the Health Districts along with the number of cases appear, as do the provinces, which contain the total number of cases from the districts that belong to each province). For Aragon, it is necessary to download as many files as there are days, and after March 2022, as many as there are weeks; in each file, there is a sheet with several tables, so the data of the number of cases and BHZ have to be copied and pasted into a single file, and the day to which the file belongs should be included as a variable.

In the Canary Islands file, each row corresponds to a single case per municipality along with the date of diagnosis, so it is necessary to add up the number of cases on the same day and in the same municipality. However, in Navarre, the number of cumulative cases for each day and BHZ is provided, thus making it necessary to obtain the number of daily cases in each BHZ per day by subtracting the value of cumulative cases up to the current day from the previous day.

In the Asturias file, there are eight columns that correspond to the number of cases in each of the eight Health Areas; it is necessary to convert the eight columns to a single column with the names of all the Health Areas, repeating for each day. In the Valencian Community, something similar happens: there are 24 columns, each compiling the number of cases per Department of Health, meaning that all the columns must be converted into a single one by compiling the names of the departments. Finally, in the Basque Country, the opposite situation occurs: each row is a separate BHZ and the columns are the days, so in this case, it is also necessary to move each day to a single column with as many rows as there are days for representation and temporal analysis with geographic information systems.

The data in the files from Cantabria, Castile–La Mancha, and La Rioja could not be used since variables are missing, related either to the territory or to the temporal distribution of the cases..

5. Discussion

The results of this work reveal the lack of standardization and heterogeneity of the data models provided by the different ACs. This mainly affects the case diagnosis procedure (PCR, antigen tests, or antibody tests), temporal registration of number of cases (daily, weekly, by wave, or cumulative), the spatial units (BHZs, Health Districts, Health Areas, municipalities, counties, or provinces), and the period of time covered (from the beginning of the pandemic to the present, the acute phase of the pandemic, and from March 2022 with the new Surveillance and Control Strategy), in addition to other data that complement the epidemiological analysis of the pandemic, such as the number of deaths or ICU admissions, the number of tests performed, total population or by age group and sex, etc.

In general, the problems found in our study in the open data portals are consistent with those obtained by **Gardner** *et al*. (2021) in the collection of Covid-19 data:

- ambiguity of the parameter definitions;
- different rates of updating variables between the portals; and
- deficiencies in the system's structure, which is probably of a hierarchical nature, obtaining the data at the local level (BHZs or municipalities) and adding them to Health Areas or provinces.

In addition, other drawbacks that hinder the reutilization of data and that are consistent with those indicated by **Alamo** *et al*. (2020) were identified: a lack of standardization in data collection, incomplete data (including only cases confirmed by a laboratory test, which also concerns the number of deaths), and a lack of precision in the measurement of key variables (for example, not collecting asymptomatic cases, which play an important role in the transmission of the virus).

Although there are a variety of formats for downloading data, in all the ACs, the files can be downloaded in a format suitable for further processing in a database or spreadsheet application, such as Excel or other similar programs (xls, xlxs, csv).

The problems posed by the lack of data normalization between ACs and the poor registration in each of them are discussed below, focusing on the core variables in spatial epidemiology: cases with Covid infection, geographical location, and temporal distribution.

5.1. Covid variables

One of the problems identified is the absence of, and/or ambiguity in, the definition of these variables, caused by a lack of metadata or an insufficient description of their meaning. The key thematic variable for the analysis of any epidemic is the number of infected cases. The *World Health Organization* defines a confirmed case as any person in whom infection has been confirmed by laboratory testing (*World Health Organization*, 2022). This fact conditions the actual estimate of infected cases, because not all people who were symptomatic and infected could access tests, especially during the early months of the pandemic, and those who were asymptomatic or mildly symptomatic were not tested.

In most of the AC files, the total number of cases appears without indicating how they were diagnosed, whether they were confirmed through diagnostic tests (PCR, antigen tests, or serological tests), and how many diagnostic tests were employed (one, several, or all), thus making any analysis of the evolution of the pandemic over time (by applying a new methodology in case accounting) and comparisons between ACs more complex.

As of 28 March 2022, following the acute phase of the pandemic, the new Covid-19 Surveillance and Control Strategy came into force, which represents a significant change in registration method, since only cases confirmed by diagnostic testing in 60 years or older, immunosuppressed, and pregnant populations are included (*Ministry of Health*, 2022). However, there are ACs in which all cases continue to be registered from this date, while in others, only those cases in people 60 years or older are still registered.

There is also a lack of uniformity regarding the number of laboratory tests, which may refer to the total number of tests performed or the number of people examined, without accurately describing the meaning of the counts (**Alamo** *et al*., 2020).

To carry out any study, it is necessary to know what a variable measures and how it has been measured. Data files should provide well-structured, organized, and detailed metadata that are of high quality and ensure the correct and appropriate interpretation of the data (**Barcellos**; **Bernardini**; **Viterbo**, 2022), so that the data can be understood and used by other researchers (**Kubler** *et al*., 2018; **Wu**; **Ma**; **Zhang**, 2021).

In this sense, FAIR data principles (findability, accessibility, interoperability, and reusability) define the characteristics that data, tools, vocabularies, and infrastructures must include to facilitate reutilization by third parties, ensuring rapid and appropriate access to complete and organized data (**Wilkinson** *et al*., 2016). Also noteworthy is the existence of the Metadata Quality Assessment (MQA) tool, developed by the data.europea.eu consortium to assess the quality of metadata of public open data and how to improve them (*Publications Office of the European Union*, 2020).

5.2. Temporal distribution

There is a lack of homogeneity in the time period recorded in the series of each AC. Although most records extend from the beginning of the pandemic to the present, some cover only the acute phase (from February–March 2020 to March 2022), only until December 2021, from January 2021 to March 2022, or from May 2020. This disparity makes it impossible to carry out a global analysis and compare, from a synchronous point of view, the behavior of the pandemic between ACs.

The temporal resolution of cases is also variable among the ACs; in some, the availability of data is daily, while in others it is weekly or even biweekly. This problem has mainly been observed when data are obtained from multiple sources (**Alamo** *et al*., 2020).

It is important that the dates of notification and registration of cases be a true reflection of reality. The delay in reporting cases and the lack of regular updating of data, at times taking several days or a weekend, may affect the accuracy and reliability of the data on the recorded dates and changes in patterns or trends not attributable to the observed phenomenon. There is also a lack of information on whether the date used for the registration of cases in the file has the same meaning in all ACs or is different, referring to the date of onset of symptoms, the date of performance of the diagnostic test, or the date of diagnosis minus three days (**Martín-Fernández** *et al*., 2021).

5.3. Spatial resolution

Another feature of the open data on Covid-19 is the lack of homogeneity of spatial units between the different ACs. One of the factors identified that have limited the use of spatial techniques to detect patterns of spread during the pandemic has been the lack of availability of data expressed in high-resolution spatial units and the bias of Covid-19 data, along with the scarcity of demographic data on a large scale or with high spatial resolution (**Fatima** *et al*., 2021). The results of our study reveal a lack of normalization in the availability of data in spatial units at different scales.

> The application of spatio-temporal analysis techniques to open data on Covid-19 is very useful to obtain geographic patterns and models that explain the dynamics, transmission and incidence of the disease

Article 62 of *General Health Law 14/1986* from April 25 (*España*, 1986) states that

> "to achieve maximum operation and effectiveness in the operation of services at the primary level, the Health Areas will be divided into Basic Health Zones" ["*para conseguir la máxima operatividad y eficacia en el funcionamiento de los servicios a nivel primario, las Áreas de Salud se dividirán en Zonas Básicas de Salud*"].

To carry out spatial and temporal studies regarding the spread, incidence, risk, and other aspects of interest related to the pandemic, it is essential to have information expressed in equivalent spatial units, such as BHZs or other administrative types of greater resolution, which should be comparable between ACs, cover the entire national territory, and be as stable as possible. This is also a necessary condition for the efficient management of health resources and for the adoption of measures to control the pandemic.

Recording in higher-resolution spatial units, such as census sections or municipalities and even BHZs, makes it possible to aggregate them, manually or automatically, into other smaller and larger units (health sectors, or others) for analysis on another scale. In contrast, operating in the opposite direction (for example, from provinces to health sectors or from BHZs to municipalities) is not direct and requires adopting certain assumptions about the distribution of the phenomenon studied and applying complex analytical techniques.

For most ACs, comprehensive data are available on the number of cases disaggregated by BHZ and day. Castile and Leon is the community with the best results in terms of transparency and information on the epidemiological situation of Covid-19; in that community, BHZs with GPS coordinates are noted. The worst community is noted to be Castile–La Mancha (**Díez-Garrido**; **Melero-Lázaro**, 2022). This is consistent with the analysis of our results, as the latter contains the final cumulative number of cases per province or the total number of cases per day for the entire autonomous community, which is not useful for subsequent data reutilization. In addition, it contains errors regarding the dates used: the 559 rows correspond to all the months of the year 2022, while the file was downloaded in May.

It is difficult to work with open data directly from official sources of the ACs, since some do not publish data, multiple methods of data collection are used, and they are not structured in a uniform way, which requires them to be reprocessed (**Ferrer-Sapena** *et al*., 2020). The open data files available come from various sources containing different variables (level of aggregation and meaning) that are organized and structured differently (in rows or columns). These deficiencies make it difficult to use them globally and for synchronous and diachronic analyses throughout the national territory. In addition, the existence of multiple files for each AC, some of which include repeated data, requires more time and resources (people and economic) to create and maintain them.

5.4. Reutilization at the national level and proposed data file structure

Currently, to carry out studies on the incidence and spread of Covid-19 throughout the national territory, it is necessary to group the data of the different ACs into a single file. The following ACs would not be included in this file: Extremadura and Ceuta and Melilla (as they do not have open data on Covid-19); Cantabria, Castile–La Mancha, and La Rioja (owing to lack of spatial or temporal data); and the Canary Islands (as it only has data by municipalities). In the rest of the ACs, the files selected in this study would have to undergo a process of restructuring and calculation of the data already described in the "Results" section, as well as normalization of the spatial variables, which would consist of grouping the Health Areas by Health Districts, and of the temporal variables, grouping the days into weeks, since this is the level of disaggregation that all the files can share.

To carry out spatial epidemiology studies at the country level, all ACs should have open data in reusable files with a homogeneous structure and the presence of metadata that accurately describe the meaning of the variables. The essential variables of the file must be related to: (a) infection: the number of diagnosed cases distributed according to different diagnostic tests (PCR, antigen tests, antibody tests), as well as the number of tests performed to confirm the diagnosis, and other variables such as hospitalizations or ICU cases and deaths; (b) spatial location: higher-resolution units such as BHZs, with their names and coordinates or geocodes; (c) temporal variables: days (full date); and (d) demographic: age and sex groups.

In this way, each row of the file would correspond to the number of cases diagnosed (distributed by test performed and by age group and sex) in a BHZ per day. The file would also exhibit desirable characteristics related to the integrity or completeness of the data (in terms of both the variables collected and the period of time covered), accuracy (diagnostic tests used for the declaration of confirmed cases), granularity (data provided on a larger scale of spatial disaggregation, by BHZ, and temporal, by days), and timeliness (data should be updated daily, without delays, so that it does not negatively affect the development of predictive models).

6. Conclusions

This article has addressed one of the fundamental principles of open data: the possibility of reutilization by third parties for studies of spatial epidemiology. From the analysis and evaluation of the open data related to Covid-19 available and accessible in the portals of the ACs of Spain, various problems have been identified that make it impossible to reutilize them for the development of spatial–temporal models of the coronavirus infection. Of these, the most important are inconsistency of data, ignorance and disparity of criteria in the meaning of some variables, basic units of nonhomogeneous analysis, lack of updating, different time series, and change of criterion in the diagnosis of confirmed cases. These problems make it impossible to compare the evolution of Covid-19 among the different ACs.

Having open data via portals is an important asset that is useful for multiple purposes, but the data must meet a series of characteristics that allow for their efficient use and thereby generate added value in research and create useful knowledge in decision-making. It is unnecessary to have a large quantity of files for each AC; the more there are, the more time and effort is needed to update them. It is sufficient to have one file for each AC that has the same structure and that collects all the important variables, which will facilitate more efficient maintenance and result in greater reliability of the data. The ACs register and publish the original data; if these are not reliable and current, their use by researchers or as secondary sources of information by other bodies, such as the Spanish *Ministry of Health*, the *European Commission*, or the *WHO*, will be completely useless.

> Not so many data files on Covid-19 are necessary in each autonomous community of Spain; one that records the main data at a higher level of temporal and spatial resolution is sufficient

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Roles and digital identities on *Twitter* and *Instagram*: An ethnographic study of Chilean journalists

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Abstract

On the basis of a digital ethnography and in-depth interviews with Chilean journalists, this study analyzes how news professionals reinterpret and redefine their professional roles on *Twitter* and *Instagram* through their practices and discourse, building different digital identities. The results of our analyses show that *Twitter* and *Instagram* strengthen and render a more complex construction of journalists' digital selves, allowing them to build a multi-dimensional identity that goes beyond the framework defined by the media in which they work through the performance of emerging and more traditional roles: (1) the service role becomes a resource for creating community-oriented identities and for helping to resolve individuals' everyday challenges; (2) the celebrity role supports the construction of an identity that plays with distances and social status, distinguishing and differentiating the journalist from others; (3) the promoter role allows them to promote their work and that of their media outlets as well as products and services, which generates a material benefit and gives the practices an instrumental meaning; and (4) the joker role allows them to entertain the audience and engage in a playful and critical way of observing the world through humor, irony, and sarcasm. Journalists make these roles compatible and decide which they want to use depending on their target audience and the specific platform used, validating certain practices and media strategies. In the case of *Twitter*, we observe a reinterpretation of traditional practices, and on *Instagram* we found a clearer redefinition of journalistic roles.

Keywords

Twitter; *Instagram*; Social media; Social networks; Journalism; Journalists; Journalistic roles; Digital identity; Journalistic identity; Promoter; Celebrity; Joker.

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1. Introduction

Over the past decade, research has theoretically and empirically analyzed how different forces shape journalistic performance through various traditional media, news beats, and social environments (See, for example, **Hallin**; **Mellado**, 2018; **Márquez-Ramírez** *et al.*, 2020; **Mellado**, 2021; **Stępińska** *et al.*, 201). Scholars also have focused on digital news platforms and on how traditional media have incorporated social media into their newsrooms (e.g., **Hermida**, 2010; **Newman**; **Dutton**; **Blank**, 2012; **Noguera-Vivo**, 2013). While these two lines of research focus on an institutional level of analysis, another area of inquiry has moved toward an individual level, examining how journalists develop different digital identities and perform multiple roles on different media platforms and spaces (e.g., **Brems** *et al.*, 2017; **Hedman**; **Djerf-Pierre**, 2013; **Klaß**; **Wellbrock**, 2019; **Lasorsa**; **Lewis**; **Holton**, 2012; **Mellado**; **Hermida**, 2021, 2022a; **Molyneux**; **Holton**; **Lewis**, 2018; **Pérez-Díaz**; **Planes-Pedreño**, 2021; **Xia** *et al.*, 2020).

The study of journalistic cultures in digital media is undoubtedly a topic of interest for both academics and industry professionals owing to the mediatization of society, the way in which the platformization of the news has gained a dominant presence among audiences (**Hermida**; **Mellado**, 2020; **Molyneux**; **McGregor**, 2021; **Nielsen**; **Ganter**, 2018; **Van-Dijck**; **Poell**, 2013; **Westlund**; **Ekström**, 2018), and the tensions that can emerge between traditional journalistic norms and practices and the media logics of social platforms (**Mellado**, 2022; **Sacco**; **Bossio**, 2017; **Tandoc**; **Cabañes**; **Cayabyab**, 2019).

Participation in digital platforms is a reality of modern daily life. Most media outlets publish their content on social media in an effort to engage with increasingly segmented audiences, and journalists do so as well. As a result, norms, routines, and professional practices have become blurred and liquid (**Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022). While the stability of the profession's institutional spaces released most journalists from actively questioning who they are and why they do what they do (**Deuze**; **Witschge**, 2020, p. 6), that is no longer the case, particularly given that journalistic identities and cultures depend on specific practices, and journalistic practices have changed significantly (**Mellado**, 2021). One important aspect of these changes has been the weakening of journalism's institutional authority (**Carlson**; **Lewis**, 2015).

Despite the important studies conducted on journalistic roles in the digital world and journalist identity formation on social media, there are various limitations that should be considered. Studies have tended to focus on a single platform, generally *Twitter* (**Canter**; **Brookes**, 2016; **Hermida**, 2013; **Pérez-Díaz**; **Planes-Pedreño**, 2021), analyzing isolated indicators with an approach that is closer to news production (**Broesma**; **Graham**, 2013).

Furthermore, they have focused on interaction between journalists and politicians, reducing their frame of action to specific topics (**David**, 2009); analyzed users' use of and interaction on social media platforms from the perspective of audience studies and not journalism studies (**Gil de Zúñiga**; **Diehl**; **Ardèvol-Abreu**, 2016; **Westerman**; **Spence**; **Van-Der-Heide**, 2014); or have focused on textual analyses of specific events like catastrophes or occurrences that are not part of regular daily life (**Hermida**; **Lewis**; **Zamith**, 2014). Most studies that focus on *Instagram* concentrate on fashion/beauty/influencers/bloggers (**Khamis**; **Ang**; **Welling**, 2016; **Maares**; **Hanusch**, 2020; **Marshall**, 2010; **Smith**; **Sanderson**, 2015) or politicians' use of the platform for presidential campaigns (**Filimonov**; **Russmann**; **Svensson**, 2016; **Lego-Muñoz**; **Towner**, 2017). Finally, most of these studies have focused on Western countries with cultural, political, and social characteristics that are difficult to transfer to other realities.

In an effort to help overcome those limitations, this study is based on a qualitative methodological design that consists of a digital ethnography of Chilean journalists focused on understanding how information professionals reinterpret and redefine their roles on *Twitter* and *Instagram*, building different types of digital identities.

2. Journalism and digital identity

As a construct, social identity is related to the way in which individuals and other social entities acquire a recognizable form within society. One fundamental aspect of understanding the formation of these identities in today's world is the instability caused by fast-paced societal changes.

In the past, individuals had limited agency over the construction of their social identities. As a result, these tended to be assigned. Today, by contrast, social identity is a complex construction that requires a great deal of dedication and creativity (**Howard**, 2000). Various authors, particularly social psychologists, have argued that identity is always in a process of construction and reformulation in a constant dialogue between the subject and their social environment (**Lynch**, 2007). As such, people must engage in individual management of the impressions that they generate in others (**Goffman**, 1981). This *performative* nature of identity leads us to define all identities as "inventions." One's own identity is the result of a reflexive process that operates as a project of constructing a personal narrative (**Giddens**, 1998) that also establishes a dialogue and negotiation with the collective for the construction of a social identity (**Brewer**, 2001).

This is particularly important for observing how content is generated on journalists' social media accounts, which stands in contrast to their work on traditional media, where what is produced cannot be attributed to a single individual, but is understood as a collective result (**Mellado**, 2015; 2021).

In this context, we will understand digital identity

> "as aspects of digital technology as a mediator in the experience of the identity built by people and conditioned by social factors (**Castañeda**; **Camacho**, 2012, p. 354, our translation).

More specifically, in the case of journalists, we will focus on the digital platforms that display their identity and the organizational context from which they come.

Social identities in digital environments tend to present fragmented forms of the individual, creating a narrative that emerges from the dialogue between the various platforms and relationships that it establishes. This refers to the capacity of individuals to 'target' their content and activity to digital spaces differentiated by audience, technical characteristics and expected behaviors in the context of the same. In this study, we focus on two digital platforms that share mechanisms through which users communicate but offer different objective qualities in terms of the characteristics of their form of narrative, textual-visual logic and audience approach: *Twitter* and *Instagram* (**Hayes**; **Carr**; **Wohn**, 2016; **Hermida**; **Mellado**, 2020).

Identities can also be understood as formations that articulate two temporalities. Identity has a synchronous nature in terms of the process of making and in the present. This is expressed in performativity, which refers to the contingent action between different agents that interact, communicate with one another and produce impressions in others. That synchronicity is fleeting and temporary and acquires a more stable meaning over time, or a diachronic axis that operates as a narrative that ties together ways of being and links the different points that the synchrony left behind.

Social identities are often translated into professional identities. Journalistic roles are a fundamental aspect of the construction of a professional identity in that they connect practical exercise with social expectations of what these journalists should be, which is discursively linked to expectations about what journalism is (**Zelizer**, 1993).

Journalists from around the world are typically socialized through a set of ideals that express an understanding of their professional roles. These roles are essential components of journalistic culture and fundamental elements for defining journalism as a profession. Journalistic cultures represent the cultural capital that journalists share. Professional roles are complex constructs that are manifested at both the perceptual level (which functions are important to the profession) and the level of performance (**Mellado**, 2021). The performance of professional roles focuses on journalism as a social practice and on the interaction between the structure, agency and political economy of media platforms, allowing for observation of journalistic ideals and their materialization.

Since the internet was created, various studies have analyzed the degree to which information technologies shape traditional journalistic practices (e.g., **Jenkins**, 2006; **Steensen**, 2011; **Deuze**, 2007). Several of these studies have found that while tools like hypertext, multimedia and the opportunity to interact with the user change how information is delivered, journalists adopt the same professional roles rather than modifying their practices. Over the past few years, however, a great deal has changed in the digital media ecosystem, particularly due to the appearance of social media (**Casero-Ripollés**; **Feenstra**; **Tormey**, 2016; **Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022) , raising questions regarding the degree to which journalists' work changes as a result of said transformations and how all of that impacts the creation of different digital "selves."

For example, **Hermida** (2013) argues that social media and "microblogging" generate new ways of practicing journalism using different logics, showing paths that allow the profession itself to be redefined. Later, **Hermida** and **Mellado** (2020) discussed the different media logics that differentiate digital platforms and influence the content generated on them.

Social media platforms privilege the construction of public persona with multiple audiences and contexts. The way in which journalists negotiate their roles and identities under the social media umbrella offers important information about how they position themselves in the new digital public sphere, particularly given that "private" and "public" and "personal" and "professional" coexist on these platforms.

The journalist is no longer the person who signs a news article or the visible and yet distant face of a radio or audiovisual platform. Today, journalists are potentially accessible people with whom one can develop a relationship mediated by social media (**Hedman**, 2016). For example, **Lomborg** (2013) has coined the term "broadcasting the self" to refer to the way in which identities are produced and circulate on social media. For journalists, thus, digital environments are new sources for building professional identities (**Ferrucci**; **Vos**, 2017).

Although they are not the only digital platforms used today, *Twitter* and *Instagram* offer journalists an important platform for improving their central position in public debate. Beyond the impact of their work, these platforms allow them to increase their social influence and gain new digital followers (**Mellado**; **Hermida**, 2022b). Furthermore, it may favor their independence from attempts of control of any kind. In this sense, recent research has addressed the possibility that in addition to the reinterpretation of certain traditional professional roles, these platforms are generating new functions (**Tandoc**; **Vos**, 2016) and building different digital identities (**Hedman**, 2016; **Bossio**, 2021).

The intrinsic capacity of social media to deinstitutionalize communication through parallel channels can become a key element for implementing different roles within journalism (**Mellado**; **Ovando**, 2021). Professional roles can evolve and be redefined –in discourse and in practice– as their appearance and development have an historical and contextual component and a strong connection to the logics that journalists use to communicate with the public and the expectations of different reference groups (**Mellado**, 2021).

In this sense, some authors have identified a certain rupture in journalists' traditional professional identity that emerges in the form of a lack of clarity and blend of their public and private identities as well as a positive attitude towards the personal brand generated through these social media platforms (**Brems** *et al.*, 2017; **Canter**, 2014; **Hedman**, 2016; **Mellado**, 2022).

3. Journalistic roles in the digital environment

The way in which journalists build their identity has a direct influence on the performance of their roles. In traditional media, information professionals are expected to follow the norms and practices created and perpetuated in the field as a means of maintaining autonomy and professional authority. Although journalism mainly operates within commercial structures, the cornerstone of that autonomy and authority has been the separation between journalists' editorial work and the commercial activities of news organizations. By contrast, social media spaces exist outside of those institutional limits and serve as spaces of connection, interaction, publication and amplification between the audience and individual journalists (**Mellado**; **Hermida**, 2022a).

From there, it is possible to deduce that the rules are not fixed, are not equal on all platforms and do not translate into the same practices. As such, journalists can generate new forms of acting in the context of social media (**Duffy**; **Knight**, 2019; **Hedman**; **Djerf-Pierre**, 2013). This does not mean that traditional journalistic roles associated with offline media cannot be practiced in social media spaces, but it does suggest that journalists are developing new identities and emergent roles on those platforms. While journalists report on a story on traditional media platforms, they are also part of the story on social media, becoming a topic (**Mellado**; **Hermida**, 2022a).

In the context of traditional media, cross-national studies have analyzed the degree to which journalists around the world are closer –through their practices and ideals– to different professional roles depending on different domains or spheres of action (**Mellado**, 2015; 2021).

- One of these is connected to the relationships that exist between journalists and those in power. Journalists can see themselves as watchdogs who observe those in power (**Márquez-Ramírez** *et al.*, 2020). They also may see their role as closer to the idea of being loyal facilitators to those in power or to the country to which they belong (**Donsbach**, 1995; **Pasti**, 2005).
- A second space is linked to the way in which journalists approach audiences. On the one hand, they can approach audiences as clients and perform a service role associated with providing information and advice in order to support them in their day to day lives and provide personal assistance (**Eide**; **Knight**, 1999). They also can play a civic role, viewing the audience as a group of citizens who should have a voice, be empowered and be educated on complex political issues (**Rosen**, 1996). Finally, they may view the audience as a spectator that needs to be approached using narrative and stylistic tools linked to the info-entertainment role (**Mellado**, 2015).
- A third domain is linked to the journalistic voice, that is, the presence of the journalist's voice in the content that reaches the public (**Donsbach**; **Patterson**, 2004). The more present it is, the greater the presence of an interventionist role. The less present it is, the greater the presence of a disseminator role.

More recently, and taking the domain of the "journalistic ego" as a point of departure to analyze journalistic practices on digital platforms, **Mellado** and **Hermida** (2021) operationalized three roles on social media: promoter, celebrity and joker.

The promoter role is practiced by journalists on social media when they develop their own "brand," promoting their work or media outlet as well as different products and services. These aspects are connected to the relationship between the journalist and their news organization –whether from a personal or a professional perspective– or the relationship between the journalist and external commercial forces (**Holton**; **Molyneux**, 2017).

The celebrity role emerges when journalists strive for fame or become stars due to their social media activity, gaining social and economic capital (**Olausson**, 2018). The main elements that define this role on social media are the presence of reflected fame (that is developed when journalists repost or retweet or share screenshots of material about them published by others); the use of "fame by association" (journalists mentioning, tagging or publishing photographs or videos in which they are seen interacting with celebrities); showing a luxurious lifestyle; elements of daily life; and the use of their own hashtag.

The joker, for its part, is present on social media when journalists use humor when commenting on their work, workplace, colleagues or sources. Previous studies have shown that news professionals can use different logics of platforms to engage in humor at the professional and personal levels (**Holton**; **Lewis**, 2011). The main practices that this role deploys are trying to be funny, the use of deliberate jokes, making fun of themselves or others, and generating fun responses to potential comments from followers.

4. Methodology

We carried out a digital ethnography that allowed us to conduct in-depth observations of the materialization of different traditional and emerging roles in the digital practices of ten Chilean journalists on *Twitter* and *Instagram*.

Digital ethnography involves producing descriptions and interpretations of behavior with enough density to delve into social practices and meanings (**Hine**, 2000) through immersion in the work of those who participate in digital spaces, paying attention to their forms of exchange and the contents produced and reproduced *in situ.* This involves recording the activity that occurs alongside its production without intermediaries (**López-Rocha**, 2010).

Research on digital technologies has established that the lines between online and offline life are sometimes strictly drawn but can also be blended and interwoven to the point that it is impossible to differentiate between the two spheres (**Airoldi**, 2018).

4.1. Sample

Ten journalists were intentionally chosen from a database generated during previous quantitative stages by the research team responsible for this study, comprised of all Chilean journalists working for Chilean media outlets with active *Twitter* and *Instagram* accounts (**Mellado**, 2019; 2022). Our sample based on the following criteria: 1) journalists with public accounts on both *Twitter* and *Instagram*; 2) journalists with an active daily digital life on both platforms; 3) journalists who work for different types of media outlets (see Table 1).

Table 1. Sample Characteristics

	Media type	Age	Gender	Position/Beat	Number of followers (*Twitter*)	Activity level (*Twitter*)[1]	Number of followers (*Instagram*)	Activity level (*Instagram*)*
Journalist #1	Radio	50-55	Female	News anchor/Political commentator	260,000 - 270,000	Very high	90,000 - 100,000	Moderate
Journalist #2	TV	31-35	Female	Reporter/ Unspecified beat	3,000 - 4,000	Moderate	2,000 - 3,000	High
Journalist #3	Print	25-30	Male	Reporter/ Entertainment	7,000 - 8,000	Moderate	1,000 - 2,000	Moderate
Journalist #4	TV	35-40	Male	Editor/Sports	80,000 - 90,000	High	50,000 - 60,000	Low
Journalist #5	TV	45-50	Male	News anchor/ Sports	220,000 - 230,000	High	190,000 - 200,000	Very high
Journalist #6	TV	45-50	Female	News anchor/ National	1,960,000 - 1,970,000	Moderate	340,000 - 350,000	High
Journalist #7	Radio	40-45	Female	News anchor/ National	360,000 - 370,000	High	270,000 - 280,000	Moderate
Journalist #8	Radio	40-45	Male	News anchor/ National	25,000 - 30,000	Very high	25,000 - 30,000	High
Journalist #9	Online	31-35	Male	Reporter and Editor/	17,000 - 18,000	High	2,000 - 3,000	Low
Journalist #10	Online	25-30	Male	Reporter/ Science and technology	5,000 - 6,000	High	Under 1,000	Moderate

* The level of activity on *Twitter* and *Instagram* was based on the intensity –none, very low, low, medium, high or very high– with which the journalist published content on each social media platform.

For each *Twitter* and *Instagram* account of the journalists selected, a calendar was built for observation and recording to provide a broad overview of their activity on these platforms. This consistency was not meant generate a sample of posts but to structure observation cycles.

Given that the media logics of *Twitter* and *Instagram* are different (**Hermida**; **Mellado**, 2020), our research team used slightly different strategies for observing and recording activities.

Four complete non-consecutive weeks in 2021 (Monday through Sunday) were used to analyze the *Twitter* accounts of the selected journalists. A similar procedure was used to analyze *Instagram* accounts, but including a total of eight weeks of material. This difference is based on previous studies conducted by the same research team that showed that journalists' *Twitter* content production far exceeds their *Instagram* production (**Mellado**, 2021, 2022). As such, a longer period was required to obtain a similar amount of content from the latter platform. A total of 962 posts were obtained, 535 from *Instagram* and 427 from *Twitter* (Table 2).[1]

Table 2. Number of posts recorded and analyzed per journalist

Journalist	*Instagram*	*Twitter*
1	32	22
2	25	49
3	43	23
4	104	21
5	108	25
6	42	42
7	62	57
8	34	128
9	47	39
10	38	21
Total	535	427

4.2. Fieldwork

A rating grid was developed as a field journal to efficiently record the posts and allow for group and individual analysis and reflection. The grid allowed us to record information on the types of posts, the platform used, publication date, the text and visual content, post type and other data. It also included a space for research notes, allowing for better interpretations and contributing to the final analysis. Based on the operationalization and definition of each role (see the subsection below), both the text and (audio)visual content of each post was analyzed as well as its relationship to the material published on each timeline, the relationship between synchronous and asynchronous content (see the subsections below) and between the content posted and interaction with the audience. Table 3 presents the general observation guidelines.

Table 3. Ethnographic observation guidelines

Record dimensions
General characteristics
Item number Publication type: post/tweet, story, reel, other Journalist's name Date of post Time of post Actual text of the post
Contents produced
Image: Screen shot of the full post including text and image Engagement: list of the most important interactions with followers Description: Narrative description of the various types of roles involved in the post, the relationship between synchronous and asynchronous content and the existence of audience engagement.
Analytical-interpretive axis
Memo: The observer records their interpretations and impressions of the material observed. Questions, hypotheses and ideas based on the material are noted in this space that can be recovered later to contribute to subsequent interpretations.

4.3. Categories of analysis

In order to observe the configuration of journalists' digital identities through the implementation of different professional roles, we based on the operationalizations proposed by **Mellado** (2015; 2021) and **Mellado** and **Hermida** (2021) –previously discussed in the conceptual section of this article– to observe the journalistic performance of traditional and emerging roles on social media. Our team considered both the definition and operationalization of those roles, but not in an effort to quantify their presence. The goal was instead to analyze how those roles are produced and reproduced on the *Twitter* and *Instagram* accounts of the news professionals analyzed, in a qualitative and exemplifying manner.

We explored the performance of the watchdog, interventionist, loyal-facilitator, service, infotainment and civic roles at the level of traditional roles. In regard to roles more closely associated with digital practices, we analyzed the performance of the promoter, celebrity and joker roles (see **Mellado**, 2015; 2021; **Mellado**; **Hermida**, 2021 for more information on the operationalization of each role).

4.4. Data collection

Both platforms have contents that can be classified in two categories based on their temporality. The first consists of "live videos", "stories," and other materials that designed to be seen and commented on simultaneously, that is, to follow the user in a synchronous manner (S). The second type of content is generally known as a post or tweet. This may contain texts and videos or images or solely text on *Twitter*. *Instagram* posts generally include an image or video accompanied by text. This type of content is organized in a continuous temporal manner in what is generally called a wall or timeline, and it can be visited and revisited asynchronously (A).

This analysis included three moments organized by week. The first consisted of observing and recording synchronous activities (S). The second was organized around the observation and record of asynchronous contents (A). The third featured triangulation (T) meetings in which the team discussed the material, notes and interpretations that emerged from each process. Once the third moment ended, the cycle began again (Figure 1).

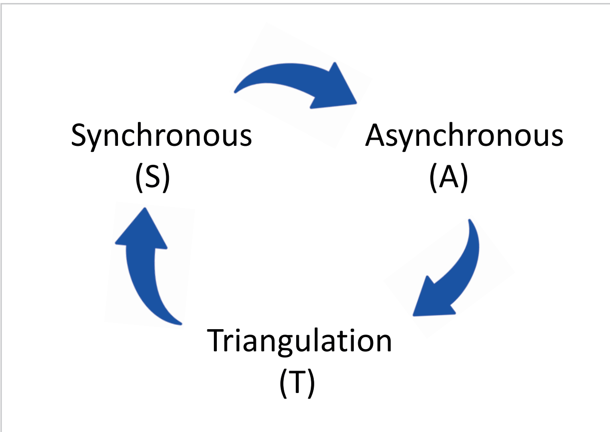


Figure 1. Cycle of analysis of the material

In order to organize the ethnographic field, a work calendar was developed as described below and executed over 12 weeks between January 4 and March 28, 2021. The ethnography was planned to take 12 weeks and was organized as shown in Table 4.

Table 4. Structure of observations

Week	1	2	3	4	5	6	7	8	9	10	11	12
Twitter	S	A	T	S	A	T						
Instagram	S	A	T	S	A	T	S	A	T	S	A	T

Latin America, and particularly Chile, offers an adequate context for the study of digital social identity and journalistic roles in social media due to the fact that social media platforms are important news sources. A recent national study found that 9 out of every 10 journalists who work for national media outlets have an active *Twitter* or *Instagram* account, and eight out of 10 have active and public accounts on both (**Mellado**; **Ovando**, 2021). This suggests a high level of penetration among members of this professional group similar to the rates reported for most developed countries (**Willnat**; **Weaver**, 2018).

5. Results and discussion

The digital ethnography identified the performance of various journalistic roles through diverse practices that model the digital social identities of the Chilean journalists studied.

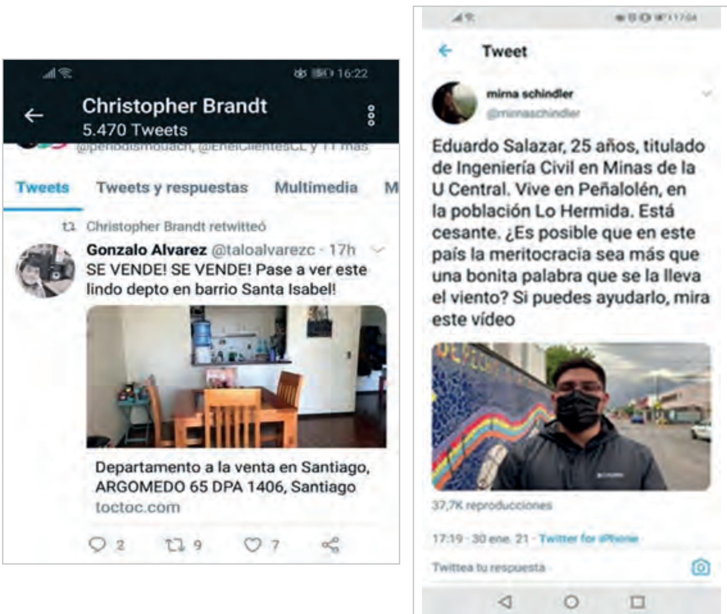
These practices range from resources close to each of the emergent roles identified by **Mellado** and **Hermida** (2021) to more traditional journalistic roles broadly analyzed in comparative studies (**Mellado**, 2021). However, it is important to note that although we included journalists with different profiles and from different news beats in the digital ethnography (see Table 1), the presence of traditional journalism roles at the level of practices was only represented through the service role and, to some degree, through the infotainment role. The presence of other roles broadly practiced in traditional media such as the watchdog or civic role, for example, was significantly lower and in some cases non-existent. As such, our results and analysis are limited to the roles that stand out in the practice of journalists on their social media accounts.

Images 1 and 2. Screenshots from *Instagram* and *Twitter*: Service role practices

5.1. Digital identity and the service role

An initial practice observed by our study is the performance of the service role. The journalists who practice this role on their social media accounts position themselves as public figures to gain more followers or support a certain cause or specific case that requires community assistance. At the same time, in cases in which an authority or legal agencies could have an impact, the goal is to call the attention of the corresponding entities/officials to a specific case in order to address the specific needs that people have in their daily lives.

Our ethnographic work revealed that the service role manifests on two levels. The first is related to specific needs that are shared or directly impact people. For example, one journalist published a call to donate plasma on *Instagram* in order to support efforts to treat



Images 3 and 4. Screenshots from *Twitter*: Service role practices a person sick with Covid-19. This connects individual need to the issue of public health. Another journalist shared information about a campaign to donate computers to students without such devices so that they could continue to attend school (virtually) during the pandemic. While this role is more present on the accounts analyzed on *Instagram*, journalists do publish similar posts on *Twitter* (Images 1 and 2).

A second level addresses the service role as a form of helping others with an inclination to support individual causes in which the beneficiary of the assistance is very specific. Image 3 shows efforts to promote the sale of a department in a specific sector of the city. Image 4 features a call to pay attention to unequal opportunities in Chile by asking for support for a young journalist who is looking for a job.

5.2. Digital identity and the celebrity role

The practice of the celebrity role is much more complex than simply "being famous." It involves knowledge of current trends and may focus on a specific group. One resource used in the practice of this role, and particularly among female journalists, is a lifestyle trend characterized by positioning oneself on social media as a person who lives a certain lifestyle, enjoying experiences and high quality products that tend to be inaccessible to most people. Journalists publish content on their travels; exclusive, healthy or particularly well-made meals; beverages; and other activities and products. While brands or specific services are observed as a clear sign of endorsement –closer to the promoter role (see below)–, this is not fundamental to the identity construction of the celebrity role. Here the key element is showing a certain lifestyle and not necessarily promoting a brand for business purposes. This strengthens "distinction" in the sense developed by Bourdieu, that is, differentiation of prestige within society (**Bourdieu**, 1984). In that way, journalists can draw a line between themselves and the audience, reinforcing their elite position. Taking advantage of such position, journalists also include lifestyle content that creates a bridge between their followers and their exclusive experience.

Images 5 and 6. Screenshots from *Instagram*: Celebrity role practices

They might also show backstage footage, opening a window onto a world that is not known by but is of interest to their followers. That window positions journalists as bridges between their workplace –which they access along with a small elite– and an audience that is far from it. As such, showing the celebrity world of the media to their followers deploys a game linked to social distances from power where the journalist can use their social media to acquire a form of prestige. For example, some journalists show images of themselves with famous people who are inaccessible to most audience members as part of what has been defined as celebrification (**Mellado**; **Hermida**, 2022b; **Olausson**, 2018).

In Image 5, a sports journalist publishes a photo of himself on *Instagram* in which he appears on the set of his TV program with other well-known professionals from Chile. In Image 6, we see another sports journalist taking a selfie with a famous soccer player and coach who is now a sports commentator. This association aligns with scholars' observations of *Twitter* activity regarding efforts to connect with others in specific contexts in order to put the journalist in a position of being part of a group (**Lomborg**, 2013).

Journalists' performance of the celebrity role also has a specific variant that moves away from ostentation and luxury. Journalists publish content related to their daily lives, showing themselves to be a person just like everyone else. This is especially common on *Instagram* and occurs only marginally on *Twitter*.

Images 7 and 8. Screenshots from *Instagram*: Celebrity role practices

Images 9- 12. Screenshots from *Instagram*: Celebrity role practices

This approach does not consist of full access to their intimate lives, but rather small signs of desirable aspects from the day to day that allow them to get attention and grow closer to their followers. This sort of content includes daily activities like cooking, watering plants or playing with children. Image 7, a photograph posted by a journalist on *Instagram*, shows flour and an egg as part of meal preparation. This form of openness does not necessarily require a filter, but it does need to be thought out and curated. The post must be designed to reach the other in an organized, pleasant and friendly context. Image 8 shows a journalist taking a selfie with no filter of himself resting on the couch with his dog after work.

This form of identity construction reveals the awareness of participating in a game in which an intentional image is built. This is not gratuitous, as it relates to the openness of the personal with the constant questioning of one's own identity (Images 9-12).

5.3. Digital identity and the promoter role

The role that is most present in journalistic practices on *Instagram* and *Twitter* is the promoter role, specifically two of its variants: advertising products and professional branding.

The social media platforms analyzed effectively serve the purpose of disseminating advertising messages. Some journalists systematically promote products and services through contracts that yield benefits ranging from small perks to higher income sponsorship agreements.

The ethnographic analysis shows that journalists approach the promoter role differently depending on the platform used. In the cases analyzed, this objective is pursued almost exclusively through their *Instagram* accounts. *Twitter* accounts tend to be used for goals more closely linked to their personal brand and professional position. As such, they are not part of strategies for direct commercial gain (or at least not those linked to promoting products and services).

Furthermore, journalists who do advertise products and services use various approaches when it comes to labeling the brands with which they have commercial agreements. Some focus on transparency, adding the

Images 13 and 14. Screenshots from *Instagram*: Promoter role practices

Image 15. Screenshot from *Instagram*: Promoter role practices

Images 16 and 17. Screenshots from *Instagram*: Promoter role practices

hashtag #advertising to the paid posts that they publish (Image 13). Others do so indirectly or in a more "camouflaged" way even when it is clear that there is a commercial exchange with the brand because they consistently tag it.

The business exchanges that are displayed in the journalists' posts tend to be accompanied by the attributes of a product or brand in which one can appreciate a formal relationship between the journalist and a third party. This can be due to the detailed and specific nature of the description, the length of the post or the work that can be perceived behind its publication, or due to the use of images from the brand itself (Image 15).

In the analysis of the audience response to journalists' posts, it is clear that the interaction that they generate with their followers is a key factor for the commercial goal. From the outset, brands consider the number of followers that each influencer has as the target audience that they could reach. At the same time, social media platforms like *Instagram* allow certain actions only after a certain number of followers is reached. This is the case of the swipe up for story option and account verification.

This offers a benefit independent of the direct interaction of the journalist in the comments. Some never respond to comments and others do so only infrequently, limiting their engagement to people they know.

Another purpose of the promoter role is the construction of mid- and long-term prestige. This refers to the development of journalists' "brand," where they differentiate themselves from others and become different types of figures. For example, in one *Instagram* story, a journalist promotes a new "live" that will appear on their *YouTube* channel. There is a clock counting down to the release of the video and a link in the story. If the user swipes up, the video opens and the journalist can promote their work (Image 16). In another post, a journalist promotes her radio program with an image of her in the studio interviewing a guest (Image 17).

An important difference is produced on this level in which some journalists conceive of their work as excluding the possibility of engaging in publicity or representing brands, as these actions weaken their credibility and neutrality.

Those who focus their digital identity on building a reliable image in journalistic terms and extol their professional work must also carefully manage their social media in order to avoid losing the prestige that they have gained.

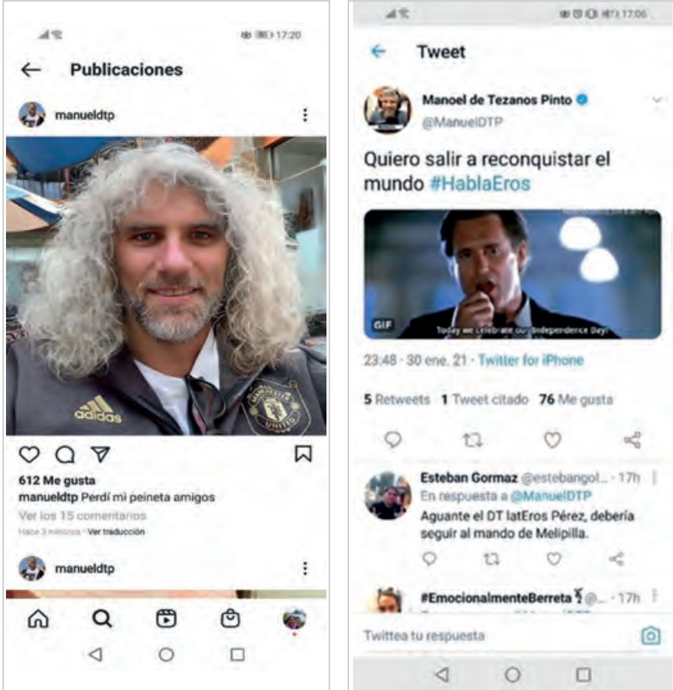
5.4. Digital identity and the joker role

On both social media platforms, and particularly on the accounts of the male journalists analyzed, humor and especially irony emerge as communication practices used across the board. This strategy nurtures interaction with audiences in that followers actively seek out humor (Images 18 and 19).

However, it is interesting that journalists who practice the joker role do not tend to include elements of celebrity in the posts in which they use humor. This result aligns with the findings of the content analyses conducted by the author of this study (**Mellado**; **Hermida**, 2022b).

Humor contributes to the construction of a narrative of themselves marked by feelings, which places journalists on a register close to the role of infotainment, but with nuances. It is possible to see that the presence of the joker role is very coherent and fluid for journalists who cover issues like entertainment or sports, as they are under less pressure to maintain a serious and structured image. However, humor may be present transversally without necessarily reaching the level of a pure expression of the joker role. Indeed, the presence of the joker is much more closely linked to irony and political critiques on *Twitter*, while *Instagram* allows for self-expression and for journalists to play, wearing costumes or creating parodies of themselves and others (Image 20).

Social media interaction can operate under the logic of a transaction in which certain practices operate as currency. The ethnographic analysis showed that there is a clear difference between forms of interaction on *Twitter* and *Instagram* (**López-Rabadán**; **Mellado**, 2019). Journalists' interaction on *Twitter* seems to take on greater importance. The journalists' target audience on this social media platform is a subject who consumes and produces a great deal of textual content. Journalists respond to their followers using fun and/or ironic approaches to generate more conversation and reactions from the audience. As other scholars have noted, *Twitter*'s functioning is based on interaction (**Lomborg**, 2013). This interaction can be collaborative or more open to conflict and confrontation.



Images 18 and 19. Screenshots from *Instagram* and *Twitter*: Joker role practices

6. Final reflections

This study analyzed how Chilean journalists reinterpret and redefine their roles on *Twitter* and *Instagram* through their daily digital practices, building different types of identity on social media.

Through a digital ethnographic analysis we observed that social media platforms allow journalists to maintain a relationship with audiences that is not episodic or restricted to their appearances in the media or the publication of their work. The interaction that they achieve with their followers on social media is important when it comes to performing various roles, especially those linked to social and economic capital, like the promoter and celebrity roles.

Second, our study supports the idea that the performance of certain roles operates as an important resource in the construction of digital identities (**Brems** *et al.*, 2017; **Mellado**; **Hermida**, 2022a; **Pérez-Díaz**; **Planes-Pedreño**, 2021). The service role is a resource for shaping identities oriented towards the community and help resolving people's daily problems. The celebrity role supports the construction of an identity that plays with distances or the journalist's differentiated social status. It brings the followers closer to the lifestyle of elites while marking the privileged position of the journalist within society. In other words, it articulates the need for the journalist to be close and far away at the same time (**Olausson**, 2018).

Image 20. Screenshot from *Twitter*: Joker role practices

Parallel to this, journalists' identity on social media may approach the role of the promoter. Driven by celebrity status, it promotes the work of journalists and their media outlets while promoting products and services, which produces a clear material benefit and gives an instrumental meaning to their practices (**Molyneux**; **Holton**, 2015). In other words, it reveals that journalistic identity on digital platforms may not be limited to serving personal narcissism but may be linked to a form of generating concrete material value.

At the same time, the journalist's identity can be directly linked to the practice of the joker role as an expression of continuity of the provision of entertainment and as a playful and critical way of observing the world through humor, irony and sarcasm (**Holton**; **Lewis**, 2011; **Molyneux**, 2015).

Third, our results show that digital identities are built through the implementation of roles that are not mutually exclusive, but that co-occur on an ongoing basis and change over time or depending on the context. Journalists align and choose the type of resources that they use depending on the target audience and the purpose of their posts. Digital identity is comprised of various fragments that bring together experience, daily life, intimacy, preferences and other forms of expression. Journalists build a narrative about themselves through their use of those roles in their practices, often creating their own editorial line on each social media platform. While some journalists maintain a single narrative on *Twitter* and *Instagram*, others build differentiated discourses for each platform.

Fourth, *Twitter* and *Instagram* strengthen and make more complex the construction of journalists' digital identity in that it generates important differences in the way that they materialize certain roles and, in doing so, build their identities. Both platforms operate as a network with a potential for professional development. That authorizes the expression of various practices and aspects of professional work, giving these professionals an individual voice and allowing them to build a multidimensional identity that goes beyond the framework defined by the news organizations in which they work.

Finally, our study shows that journalists' digital practices tend to operate as resources for building identities with various purposes, and that *Twitter* and *Instagram* participate in that identity construction in a complementary manner. Each platform privileges certain media strategies and digital practices. *Twitter* tends to serve a role more closely linked to the daily work of a newsroom. For its part, *Instagram* can satisfy the journalist's digital identity in terms of their personal life, or at least their life outside of work in the newsroom. In this sense, *Instagram* seems to operate as a window onto the intimate lives of information professionals, contributing to the construction of trust. Daily life experiences such as interaction with family and friends, pets, hobbies, practices associated with lifestyles (meals, athletics, clothing, vacation, etc.), consumer culture (books, films, TV series, etc.), and other personal activities show that these are individuals that are more than the general image that they project through the media. In that way, the results of this digital ethnography triangulate the findings of previous studies that examine journalistic performance on social media through content analysis (**Mellado**, 2022; **Bossio**, 2021; **Negreira-Rey**; **Vázquez-Herrero**; **López-García**, 2022).

While this finding represents the general overview, it is also possible to observe in the activities of the journalists analyzed that the public and private spheres are not completely separate on social media. Rather, they articulate and dialogue with the journalist's "complete self." Although they use their social media separately, audiences have access to their various "identities" and can create their own global vision of them based on a combination of those contents. *Instagram* and *Twitter* thus help journalists to go beyond the limits imposed by their news beat on traditional media platforms.

This research contributes to the understanding of how journalists build their digital social identity in digital environments from a qualitative perspective. However, it presents various limitations that should be recognized, as well as avenues for future studies.

First, the qualitative approach of this study calls for caution in regard to generalizing its conclusions to the Chilean professional collective. More specifically, the roles analyzed through the digital ethnography of the accounts of ten Chilean journalists attest to a framework of practices that have been outlined in other studies but are identified only initially here among the digital culture characteristics of Chilean journalists. Future studies should thus replicate this study using larger samples of journalists and with journalists who present more diverse characteristics, such as regional journalists or professionals who work for independent media outlets.

Second, while our study analyzes the daily practices of journalists in their social media activity, it does not compare those practices to the discursive construction of digital identity by these media professionals. It is therefore important for future studies to analyze the degree to which journalists can recognize their own practices and the gap between their narration of their activity and what is reflected on their social media accounts.

Third, future studies should analyze both journalists' posts and the content of their profiles in order to understand how they play their role on different platforms from a different perspective and the degree to which their actions are influenced by the guidelines of their news organizations.

Finally, this study is limited to the qualitative observation of certain traditional and emerging journalistic roles that were operationalized previously by specific authors on *Twitter* and *Instagram*. However, there is a wide variety of potential roles not included in this research that could be addressed in future studies. This is also true of other social media platforms that are becoming more important for journalistic work. In this context, new studies could engage in an analysis of more roles and platforms in order to identify different variations in the construction of digital identities.

7. Note

1. *Twitter* threads are considered a single post in our count of posts analyzed. *Instagram* stories comprised of one or more slides are also considered a single post if they address a single thematic unit of content.

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Accountability of unaccountable institutions: oversight of the press, social networks, and the *Spanish Parliament* over the Spanish king emeritus

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Abstract

Convictions of political corruption depend on public communication, since for citizens, to perceive deviant behaviours, these must receive attention. In Spain, this type of behaviour is part of the agendas of citizens, media, and politicians and, to fight against it, accountability is essential. In addition to the judiciary and legislature (in their oversight role), the media and social media help voters, MPs and others to make informed decisions and press for action. However, the interrelationships between different agents, types, and forms of control for accountability are a rather unexplored research topic, especially when considering non-accountable institutions (those that have power, but are not directly accountable to the electorate, such as the monarchy). The debate on the inviolability of the emeritus presents a perfect scenario to describe what formulas and what kind of sanctions (legal, labour, reputational or personal) for accountability have occurred in Spain in the case of a non-accountable institution. This study explores the agendas of media, *Parliament*, and *Twitter* (and their inter-influences) during the Geneva papers scandal. We analyzed 189,037 tweets, 1,220 journalistic pieces and 78 parliamentary initiatives related to the former monarch. The main results show that the media, social networks, and *Parliament* have acted as agents of accountability with Juan Carlos I, as if it were an accountable institution. Online newspapers and *Twitter* have led the oversight, while the parliamentary initiative has been ineffective and has essentially served as an instrument of partisan communication.

Keywords

Accountability; Not responsible institutions; Public agenda; Political agenda; Media agenda; Corruption; Transparency; Scandals; Media; Press; Social networks; Social media; *Twitter*; *Spanish Parliament*; Monarchy; King Juan Carlos I; Geneva papers; Spain.

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1. Introduction

Corruption is an illegitimate exchange of resources involving misuse by people in positions of power for private gains or purposes (**Asomah**, 2020; **Berti**, 2018; **Bratu**; **Kažoka**, 2018; **Mancini**; **Mazzoni**; **Cornia**, 2017; **Park**, 2012; **Zamora**; **Marín-Albaladejo**, 2010). It concerns both individual acts and standardized practices in public and/or private organizations (**Breit**, 2010; **Camaj**, 2013; **Park**, 2012). The benefit sought may be direct or indirect, tangible or intangible (**Matkevičienė**, 2017). Specifically, political corruption is that in which actions impact the general interest or what is socially considered the proper operation of the system (**Zamora**; **Marín-Albaladejo**, 2010). Only when questionable behavior is exposed is there talk of a scandal (**Damgaard**, 2018; **Nyhan**, 2015; **Yan**; **Liu**, 2016), which usually elicits a negative reaction from the public (**Thompson**, 2001) with a consequent response.

Political corruption scandals are, therefore, necessarily mediated through intense public communication (**Esser**; **Hartung**, 2004). This proves to be essential, because if deviant behaviors do not receive adequate attention, citizens will not be aware of them (**Canel**; **Sanders**, 2005; **Vorberg**; **Zeitler**, 2019). Communication is thus the bellwether that indicates the existence (or absence) of a scandal (**Waisbord**, 2004).

Political corruption is a threat to development and democracies. In Spain, it occupies a relevant place in public (**Rodríguez-Díaz**; **Castromil**, 2020), political, and media agendas (**Porras-Gómez**, 2014). In particular, the press has devoted significant coverage to reporting on these issues (**Sola-Morales**; **Zurbano-Berenguer**, 2019), turning them into scandals (**Restrepo**, 2005).

1.1. Democracy, accountability, and unaccountable institutions

Accountability is an important tool in the fight against political corruption. It restricts the misuse of power by subjecting it to publicity, the need to justify actions, and the threat of sanctions (**Schedler**, 1999). The concept involves two main dimensions: answerability, which concerns transparency and the provision of explanations, and enforcement, which could come in the form of submission to the ballot box, judicial sanctions or penalties, loss of reputation, or job loss (**Cortés-Arbeláez**, 2014; **Schedler**, 1999).

These two dimensions of accountability may, however, have different applications in the case of accountable or unaccountable institutions (**Fox**, 2006; **Garrido**; **Martínez**; **Mora**, 2020; **Neilson**; **Tierney**, 2003).[1] As explained by agency theory (**O'Donnell**, 2010), in modern democracies there are institutions directly elected by citizens and others that are not.

In the first of these cases, when a scandal arises, direct punishment can be carried out by exercising vertical oversight, particularly through voting. Such is the case with the withdrawal of support for political parties when they have been implicated in corruption cases, as in Spain, or with less orthodox removals from power, as with the scandals of Fernando de la Rúa in Argentina (**Pousadela**, 2010).

However, in the second case, when it comes to institutions referred to as unaccountable, which have power but are not directly accountable to the electorate for their actions (such as heads of state or modern monarchies), it is only possible to exercise horizontal oversight (the control of some institutions by others). In this framework, democracy comprises agencies (ombudsmen, auditors, controllers, councils of state, public prosecutors, comptrollers, etc.) in charge of supervising, preventing, discouraging, pushing for sanctions on, and/or sanctioning the allegedly illegal actions or omissions of other institutions (**O'Donnell**, 2004). In this sense, indirect supervision of the government, as a form of horizontal oversight, is one of the main functions of parliamentarism itself **(García-Martínez**, 1988).

There is, however, a third type of accountability, that is, diagonal (**Goetz**; **Jenkins**, 2010; **Lührmann**; **Marquardt**; **Mechkova**, 2020), which is intermediate in nature and builds on and affects the other forms. This is the oversight often exercised by the media that, with its coverage of corruption cases –alone or in conjunction with oversight by other entities– influences these institutions, the general public, and the actions of those involved.

Withdrawal of the vote can only occur with accountable institutions. However, this does not imply that other types of accountability cannot be demanded from unaccountable institutions. In fact, these entities can be punished through the other dimensions of accountability, such as legal sanctions, job loss, personal injury, or loss of reputation.

> The mutual interrelationships between different agents, types, and forms of oversight are a research topic still relatively unexplored empirically, especially with regard to unaccountable institutions

The media are important accountability agents (**Mainwaring**; **Welna**, 2003), as the press's role as a watchdog encompasses holding the government accountable (**Dauda**, 2018). However, coverage of scandals draws the attention of not only citizens (who may change their vote) but also other institutions, such as *Parliament* or the prosecutor's office. These can prompt explanations from the leaders and bring about their punishment. An example of this dynamic is the British newspaper *The Sun*'s reporting on the sex scandals involving the deputy leader of the conservative party in the *British Parliament*, Chris Pincher, which led to the early resignation of Boris Johnson after his cabinet and the entire *British Parliament* demanded explanations (*BBC news world*, 2022).

> The main dilemma was whether the king emeritus could be subject to judicial control for his private acts and also to other types of oversight in line with the accountability frameworks of unaccountable institutions

Levels of freedom of expression, self-censorship, bias, or corporate ideology are considered dimensions for assessing the power of media oversight. Depending on these dimensions, among others, the press facilitates, to a greater or lesser extent, the ability of citizens (but also for congressmen and other entities) to make informed decisions and, moreover, to pressure institutions to act (**Peruzzotti**; **Smulovitz**, 2006).

With the explosion of digitization, social media also operates as an accountability agent (**Suchman**, 1993; **Treem**, 2015). It supplements the watchdog role traditionally associated with the media (**Agbo**; **Chukwuma**, 2017) and influences (and is influenced by) the actions of other accountability agents (**Ceron**, 2017).

Although there are studies on transparency and accountability in Spain (**Manfredi-Sánchez**; **Herranz-de-la-Casa**; **Calvo-Rubio**, 2017; **Pérez-Curiel**; **Jiménez-Marín**; **Pulido-Polo**, 2021), the mutual interrelationships between different agents, types, and forms of oversight are a research topic still relatively unexplored empirically, especially with regard to unaccountable institutions. The scarcity of these types of institutions may explain the lack of studies, but it does not justify the lack of research. Contributing to the literature on accountability in these cases is the theoretical objective of this paper.

The debate about the king emeritus in Spain is a perfect scenario for this. Spain is a parliamentary monarchy: a form of government with a representative system in which the king exercises the function of head of state under the control of the legislative branch (the *Parliament*) and the executive branch (the *Government*). However, Article 56.3 of the *Spanish Constitution* states that

> "The person of the King is inviolable and shall not be held accountable. His actions will always be countersigned" ["*La persona del Rey es inviolable y no está sujeta a responsabilidad. Sus actos estarán siempre refrendados*"].

On the other hand, Article 64 states that:

> The King's acts shall be countersigned by the President of the Government and, when appropriate, by the competent ministers. The nomination and appointment of the President of the Government, and the dissolution provided for under Article 99, shall be countersigned by the Speaker of Congress. The persons countersigning the King's acts shall be liable for them. [*Los actos del Rey serán refrendados por el Presidente del Gobierno y, en su caso, por los Ministros competentes. La propuesta y el nombramiento del Presidente del Gobierno, y la disolución prevista en el artículo 99, serán refrendados por el Presidente del Congreso. De los actos del Rey serán responsables las personas que los refrenden*] (*España*, 1978).

Recent works (**Garrido**; **Martínez**; **Mora**, 2020) suggest that the Spanish monarchy –compared with other unaccountable institutions, such as the ombudsman, the *Constitutional Court*, or the armed forces– currently behaves, with respect to public opinion, in a distinctive way by resembling typical political institutions in the chain of accountability, such as the *Government*, the *Parliament*, or political parties. In contrast to the monarchy's behavior in the eyes of public opinion in previous periods, such as the 1990s (in which its evolution was very similar to that of the rest of the unaccountable institutions), today the data would place it in the middle ground, between both types of institutions.

In 2014, an unprecedented situation occurred in Spain when Juan Carlos I abdicated in favor of his son, Felipe VI, becoming king emeritus. Public awareness of some of his actions during his reign gave rise to various scandals as well as a debate focused, on the one hand, on the suitability of the model of the Spanish State and, on the other, on whether the former monarch was (or was not) inviolable in all respects. The main dilemma was whether he could be subject to judicial control for his private acts and also to other types of oversight in line with the accountability frameworks of unaccountable institutions. This context is precisely where this research is focused.

1.2. Chronicle of King Juan Carlos' scandals: the Swiss Papers

On April 13, 2012, King Juan Carlos suffered a domestic incident in Botswana (where he was on a luxury hunting trip) that sparked the biggest crisis of his reign (**Preston**, 2012). Upon being repatriated, the monarch faced a television camera and apologized with these words:

> "I'm so sorry, I was wrong; it won't happen again" ["*Lo siento mucho, me he equivocado; no volverá a ocurrir*"].

These words would eventually become some of the most famous of his reign (*Europa Press*, 2018).

The photograph of Juan Carlos I taken on this hunt posing in front of a dead elephant was the featured story of numerous media outlets and signaled the beginning of his decline in Spanish public opinion. The monarchy's image plummeted to historic lows, and Spaniards rated their confidence in the institution as 3.68 out of 10 (*Centro de Investigaciones Sociológicas [CIS]*, 2013).

> Transparency, as the right to receive information, is an important aspect of accountability. It is the opposite of opacity and censorship, sometimes related to unaccountable institutions

A year later, the Spanish–Saudi investment fund scandal hit the media. The scheme, devised during Juan Carlos' official visit to Saudi Arabia in April 2006 and managed by Corinna zu Sayn-Wittgenstein, proved to be a major fiasco for companies (**Gago**, 2013). Corinna charged *Cheyne Capital* for her services, and her bill came to about $5 million (**García-Abadillo**, 2013). Fourteen months later, on June 2, 2014, the abdication of the king was announced. *Fundamental Law 3/2014* (*Ley orgánica* 372014) established that Juan Carlos I would retain the dignity of king emeritus and would assume the formal functions entrusted to him by the new king (*España*, 2014).

At that time, 76% of Spaniards considered the decision appropriate (**Cruz**, 2014): according to the *TNS Demoscopia* survey, two out of three citizens believed that the abdication happened at an appropriate time, and 60% supported the proclamation of Prince Felipe as the new king (*Antena 3 noticias*, 2014). The abdication improved the *Crown*'s image (increasing from 49.9% to 55.7% in favor of the continuation of the monarchical institution), and there was an increase in support for the monarchy among voters of the different political parties (**Cruz**, 2014). In June 2014, a few days after his abdication was announced, King Juan Carlos was rated 6.9 out of 10 in terms of the respect he inspired among citizens (*El país*, 2014). Despite his resignation, the institution of the *Crown* did not regain popularity; in the April 2015 statistical study from the *Center for Sociological Research* (*Centro de Investigaciones Sociológicas*), it barely received 4.34 out of 10. Since that year, the organization has not asked Spaniards about the head of state (**Romero**, 2020).

Four years after the abdication, in July 2018, two digital media outlets released recordings in which Corinna accused Juan Carlos I of having collected kickbacks (100 million euros) for the contract awarded for the construction of the high-speed Mecca–Medina train line, as well as of hiding his alleged fortune in Switzerland using front men and shell companies (**Cerdán**, 2018; **Montero**, 2018).

On March 3, 2020, the Genevan newspaper *Tribune de Genève* revealed that, owing to the dissemination of these recordings, the chief prosecutor (*premier procureur*) of the canton of Geneva, Yves Bertossa, was carrying out a secret criminal investigation into the possible crime of aggravated money laundering: he suspected a link between the Saudi monarch's gift and the contract awarded for the construction of the AVE to Mecca (**Sylvain-Besson**, 2020). *National Court* Judge Manuel García Castellón asked the *Swiss Prosecutor's Office* for information on the case (**Parera**; **Olmo**, 2020).

Following this, on March 15, 2020, the royal household announced that King Felipe VI was renouncing any financial inheritance from his father and that the former monarch would no longer receive the stipend allocated to him in the royal household's budget (**González**, 2020a).

In contrast to the Swiss justice system, the Spanish *Anti-Corruption Prosecutor's Office* made little progress in its investigation, which was immediately halted. The *Public Prosecutor's Office* argued that it never received the cooperation from Saudi Arabia that it needed to access the documents related to the awarding of the AVE contract (**Olmo**, 2021). On June 5, the Attorney General of the State, Dolores Delgado, issued a decree in which she appointed Juan Ignacio Campos (**Rincón**, 2020), a prosecutor of the *Supreme Court* specialized in economic crimes, to lead this investigation.

On July 8, after it became known that Juan Carlos I had not paid taxes on the money he had in a Swiss bank, the President of the *Government* described this information as upsetting and disturbing, praised the media for not looking the other way, and said that justice was being served (**Hernández**, 2020): "Institutions are not judged, people are judged" ["*No se juzgan instituciones, se juzgan personas*"], said Sánchez (**Cueto**, 2020).

The head of the executive branch thanked the royal household for distancing itself from Juan Carlos I but made it clear that any decision fell to the head of the *King's Household*, that is, to Felipe VI himself (**Hernández**, 2020). Several ministers urged the head of state to make a drastic decision for fear the scandal would tarnish the institution (**González**, 2020b), and a public debate arose in some circles as to whether Juan Carlos I was worthy of the status of king emeritus, which the *Government* could withdraw.

Following all this information, on August 3, 2020, the *King's Household* published a letter in which Juan Carlos I informed King Felipe VI of his desire to leave the country due to the growing public backlash from "certain past events in his private life" ["*ciertos acontecimientos pasados de su vida privada*"] (**León**, 2020). However, to make it clear that this was not an attempt to evade justice, the former monarch's lawyer, Junco, assured that his client remained "at the disposal of the *Public Prosecutor's Office* for any procedures or actions deemed appropriate" ["*a disposición del Ministerio Fiscal para cualquier trámite o actuación que se considere oportuna*"] (**León**, 2020). On August 17, the Spanish royal household confirmed that Juan Carlos I was in the United Arab Emirates (**Yeste**, 2020).

The socialist government washed their hands of this decision, which it ascribed exclusively to the royal household, and in fact did not inform the opposition (**Morillo**, 2020). However, in some circles, it was seen as a clear imposition by the Executive (*Europa Press*, 2021).

On December 9, 2020, the king emeritus paid more than 600,000 euros to the Treasury to regularize his tax situation (**Gálvez**; **Rincón**, 2020). In February 2021, he made a second tax adjustment, paying 4 million euros (**Irujo**; **González**, 2021).

One and a half years later, on March 2, 2022, the *Anti-Corruption Prosecutor's Office* closed the case, despite the existence of evidence of conduct that could be linked to tax and corruption crimes, because the statute of limitations had lapsed; the incidents could not be prosecuted because they had been committed before 2014, when Juan Carlos I was shielded by the inviolability granted to the head of state by Article 56.3 of the *Constitution* (*España*, 2014). The allegedly criminal acts of 2014 (donations of money never declared to the Spanish Treasury) would not have been penalized criminally owing to the king emeritus's tax adjustment, which the *Prosecutor's Office* considered appropriate (**Rincón**, 2022).

A timeline of Juan Carlos I's case can be seen in Table 1.

Table 1. Timeline of Juan Carlos I's case

Periode	Event
2008–2018	**August 2008** Juan Carlos I allegedly received a donation of $100 million from Saudi Arabia's *Ministry of Finance* through the Swiss bank *Mirabaud*.
	Summer 2012 Juan Carlos I allegedly donated the euro 65 million that remained in that bank account to Corinna Larsen.
	June 2014 Juan Carlos I abdicated to his son Felipe, crowned Felipe VI, and came to be known as king emeritus.
	July 2018 Several media outlets made public tapes that contained conversations from 2015 between former commissioner José Villarejo, Corinna Larsen, and the former president of *Telefónica*, Juan Villalonga. In them, Larsen accused Juan Carlos of collecting of kickbacks for the AVE to Mecca, as well as the use of front men to hide money in Switzerland. The Swiss prosecutor Yves Bertossa then launched an investigation to trace the donation.
2018–2022	**September 2018** *National Court* Judge Diego de Egea archived the case opened just a month and a half previously based on Larsen's words. The magistrate alluded to the lack of evidence against the king emeritus.
	September 2019 *Anti-Corruption* prosecutor Luis Pastor interrogated Corinna Larsen to investigate possible international bribery in the alleged kickbacks from the AVE to Mecca.
	October 2019 Swiss prosecutor Yves Bertossa met with the chief anti-corruption prosecutor and other Spanish prosecutors in relation to a possible crime of international bribery with the AVE to Mecca.
	December 2019 Bertossa calls Corinna Larsen; Juan Carlos's alleged front men, Arturo Fasana and Dante Canonica; and the representatives of the private bank *Mirabaud* under investigation.
	March 2020 The newspaper *The Telegraph* revealed that Felipe VI appeared as a beneficiary of the *Lucum* foundation, linked to his father, a situation of which the monarch had been aware since March 2019. On the 15th of that month, the current king renounced the inheritance received from Juan Carlos I. The king emeritus would no longer receive the stipend allocated to him in the royal household's budget.
	June 2020 The *Attorney General* of the State appointed Juan Ignacio Campos, a prosecutor of the Chamber of the *Supreme Court* specialized in economic crimes, to lead the investigation.
	July 2020 The President of the *Government* describes the information about Juan Carlos I as "upsetting" [*inquietante*] and "disturbing" [*perturbadora*], praises the media for not looking the other way, and states, "Institutions are not judged, people are judged" ["*No se juzgan instituciones, se juzgan personas*"].
	August 2020 On the 3rd, the *King's House* published a letter in which Juan Carlos I informed King Philip of his desire to leave the country. On the 17th, the Spanish royal household confirmed that Juan Carlos was in the United Arab Emirates. The government did not inform *Parliament* or the opposition in any way.
	December 2020 Juan Carlos paid more than 600,000 euros to the Treasury to regularize his tax situation.
	February 2021 Juan Carlos made a second payment of 4 million euros to the Treasury to regularize his situation.
	March 2022 The *Anti-Corruption Prosecutor's Office* closed the case.

1.3. Publishing, public concern, and the politics of monarchy: from self-censorship to polarization. A state of affairs

Transparency, as the right to receive information, is an important aspect of accountability. It is the opposite of opacity and censorship, sometimes related to unaccountable institutions.

For years, in Spain, the head of state enjoyed special treatment in the media. The immunity granted by the *Constitution* and the protection of Articles 490 and 491 of the *Penal Code* placed the monarch above reproach (**Ramos-Fernández**, 2013). Beyond occasional news about private matters, it was not until 2012, after the Botswana incident, that this pact of silence was broken.

Coverage of this incident forced the media to establish their position: long-established newspapers such as *El país* made explicit displays of support for the monarch, whereas others such as *El mundo* expressed tentative criticism (**Ramos-Fernández**, 2013). For a third group, the incident marked the beginning of the systematic oversight of the monarch. From then on, especially digital newspapers began to investigate King Juan Carlos I and to uncover his scandals (**Arenas-García**, 2009).

In 2014, *El confidencial* published an exclusive related to the abdication during the institutional crisis of the monarchy (**Zarzalejos**, 2021) and in the context of the decline in popularity of the then monarch (**Garcés-Urzainqui**, 2020). In 2018, *Okdiario* and *El español* brought to light the recordings of Corinna zu Sayn-Wittgenstein, commissioner José Manuel Villarejo, and the former CEO of *Telefónica* Juan Villalonga, which hinted at Juan Carlos I's corruption (**Lardiés**, 2019). It was the Genevan newspaper *Tribune de Genève* that uncovered the secret investigation conducted on the king emeritus in Switzerland and *El confidencial* that, over a year later, revealed the existence of another account.

The media's positions regarding the issue varied, and studies such as those of **Garrido-Rubia**, **Martínez-Rodríguez**, and **Mora-Rodríguez** (2021) confirmed the existence of partisan hearings regarding the *Crown*. These authors evaluated the relationship between political predispositions and the consumption of stations, media, and news affecting the perception of the Spanish monarchy. They found selective exposure and perception, which has already been tested extensively in political communication (**Humanes**, 2014; **Martín-Llaguno**; **Berganza-Conde**, 2001).

Although official polls have not asked about the monarchy since 2015, analyses indicated that they were beginning to detect an increase in indignation at the possibility that the monarch would not be held accountable for his activities owing to his inviolable status (**Garcés-Urzainqui**, 2020).

There was much discussion on social networks surrounding the king emeritus's scandals, but analysis of this debate, specifically on *Twitter*, is practically nonexistent.

The only exploratory work regarding the tweets about Juan Carlos I focuses on the accounts of the political parties, not on general conversation. This exploratory work concludes that, between the outbreak of the Swiss Papers scandal and emeritus's departure, politicians sent more tweets in favor of the monarchy than against it and that the digital political narrative on the monarchy is meta-referential: the parties' strategy focuses not so much on the emeritus's actions as on alluding to the position of the other parties with respect to the *Crown* (**Duque-Mantero**, 2021).

This strategy is not coincidental since, in the political environment, as a result of the publication of some information, the monarchy began to appear as an object of indirect parliamentary oversight (since the representatives only can hold the *Government* accountable). Demands for the opening of commissions of inquiry regarding Juan Carlos I became frequent in the *Congress of Deputies* (**Casqueiro**, 2020) as part of the strategies of parliamentary groups. **Pina** (2021) points out in this regard that the arrival of *Podemos* and *Vox* thus produced a politicization of the monarchy, to the point that defending or attacking it became part of the partisan agenda.

2. Objectives and hypotheses

This study explores the media, *Parliament*, and *Twitter* agendas (and their interinfluences) during the Juan Carlos I papers scandal (in terms of level of attention and focus of attention) to examine how the press, representatives, and citizens have exercised oversight to hold the king emeritus accountable.

Given that an unaccountable institution cannot be penalized at the ballot box, our aim is to determine whether the two dimensions of accountability –answerability (as transparency and accountability) and enforcement (as the imposition of different sanctions)– have been exercised through different agendas.

Based on the theoretical reviews and conceptualizations presented, we begin with the following basic hypotheses:

> H1. Despite technically being an unaccountable institution, as discussed above, the Spanish monarchy is unique in that it resembles typical political institutions in the chain of accountability. In this sense, the media, social networks, and *Parliament* have acted as oversight agents for the king emeritus by subjecting him, the royal household, and the *Government* to the publication and need for justification of his actions and exposing him to the threat of sanctions.
>
> H2. Diagonal oversight has proven to be fundamental in the case of the unaccountable institution of the Spanish monarchy.

– Public (social networks) and published (media) communication have played an essential role in promoting transparency, demanding accountability, and publicizing punishments.
– On the other hand, diagonal oversight (exercised by the press and social networks) has been key to the impetus of horizontal oversight, specifically for the parliamentary oversight of this institution.

H3. Parliamentary oversight over the king emeritus (horizontal oversight) has been exercised, but it has acted more as a tool for partisan communication than as an accountability tool.

3. Methods and materials

To meet our objectives and evaluate our hypotheses, we conducted a quantitative content analysis on three different samples drawn from *Twitter*, the media, and parliamentary proceedings, which are explained below.

3.1. Materials

3.1.1. *Twitter*

We collected 189,037 tweets related to Juan Carlos I between March 1, 2020, and March 31, 2021, both inclusive. We used “Juan Carlos I” and “Rey Emérito” [“king emeritus”] as keywords in the tweets and tags. The extraction was performed by using a *Python* script that connected to the *Twitter* API for Academic Research, which provides access to historical data and allows for the application of filters for extraction. The API searches a random sample of tweets posted within queries that reflect public discourse. The user, date, location, and number of retweets were extracted.

We followed all requirements of the *General Data Protection Regulation* (*GDPR*) (*Comisión Europea*, 2016) and complied with the guidelines of the *Twitter Developer Agreement and Policy* (*Twitter*, 2020) and its *Display Requirements* (*Twitter*, n.d.) and *Automation Rules* (*Twitter*, 2017).

3.1.2. Press

We used *Factiva*, an international news database produced by *Dow Jones* that provides users with a wide range of data to select news articles for authorized subscribers. The website has options that allow the user to search within a specific time period for articles containing certain words. To be included in this study, articles published between March 1, 2020, and March 31, 2021, had to contain the terms “Juan Carlos I” or “*Rey Emérito*” [“king emeritus”]. Three leading news outlets were analyzed: *El país*, the leading national newspaper in average daily readership and unique users in January 2022 according to *GfK DAM* (*Dircomfidencial*, 2022); *El mundo*, the national newspaper that ranked second in average daily readership and unique users in January 2022 according to *GfK DAM* (*Dircomfidencial*, 2022); and *El confidencial*, the national digital newspaper that uncovered the Swiss papers. After filtering the results and selecting only the content that referred to the king emeritus’ scandals, there were 1,220 journalistic pieces (426 from *El país*, 610 from *El mundo*, and 184 from *El confidencial*).

3.1.3. *Parliament*

Finally, we used the website *congreso.es* to gather all parliamentary initiatives between March 1, 2020, and March 31, 2021, that were related to Juan Carlos I. *Congreso.es* has a database that provides users with extensive information to choose legislative projects of parliamentary groups and representatives, parliamentary questions, and proposals. The website has options that allow the user to search for initiatives containing certain words within a specific time frame. Using the same time frame as with the news items and tweets and the selected terms (“*Rey*” [“king”] and “Juan Carlos”), 78 initiatives were collected.

3.2. Method

All the documents studied were initially stored in an Excel file and then processed by using *SPSS 26* software.

In all cases, the number of posts (to identify the peaks with the most activity) and the most repeated words (to find frame or approaches) were counted. The figures displaying the timeline and correlations were produced from these data.

Bivariate correlation is a statistical technique designed to determine: (a) whether two variables are related; (b) whether the relationship is strong, moderate, or weak; and (c) what direction the relationship has at a particular point in time.

Cross-correlation, on the other hand, tracks these movements between variables over time. It is used to determine the time at which the best correlation occurs and over what lag the greatest effect of one variable on another occurs.

In order to establish the focuses, we initially used the *Maxqda* software. This program can be used to analyze terms and organize results, establishing categories that facilitate analysis for data interpretation.

After conducting an initial exploratory analysis of press headlines and parliamentary proceedings, we determined categories of analysis to classify the topics covered by the information collected using a protocol.[2] Once this had been defined, manual coding of the text was carried out by two specially trained coders, achieving a Kappa index of 0.93 for inter-rater reliability and 0.95 for intra-rater reliability. These data were used to analyze correlation with the volume of tweets and interpret frames.

4. Results

4.1. Public (tweets), published (journalistic pieces), and parliamentary attention paid to the Juan Carlos I scandal over time

Graph 1 shows the attention given to the scandal involving King Juan Carlos by *Twitter*, the media (*El país*, *El mundo*, and *El confidencial*) and the parliamentarians.

The average number of tweets about the king emeritus in the 396 days analyzed was 478, with a maximum of 11,797 on August 4 (the day Juan Carlos I left Spain). The maximum number of news items in both *El país* and *El mundo* was 17 (in the former on August 4 and in the latter on August 6) and 6 in *El confidencial* on August 3, the date on which the royal household made public the announcement that Juan Carlos I was leaving Spain. His departure from the country, which formalized the estrangement mentioned by the President of the *Government*, was the event that attracted the most media and public attention.

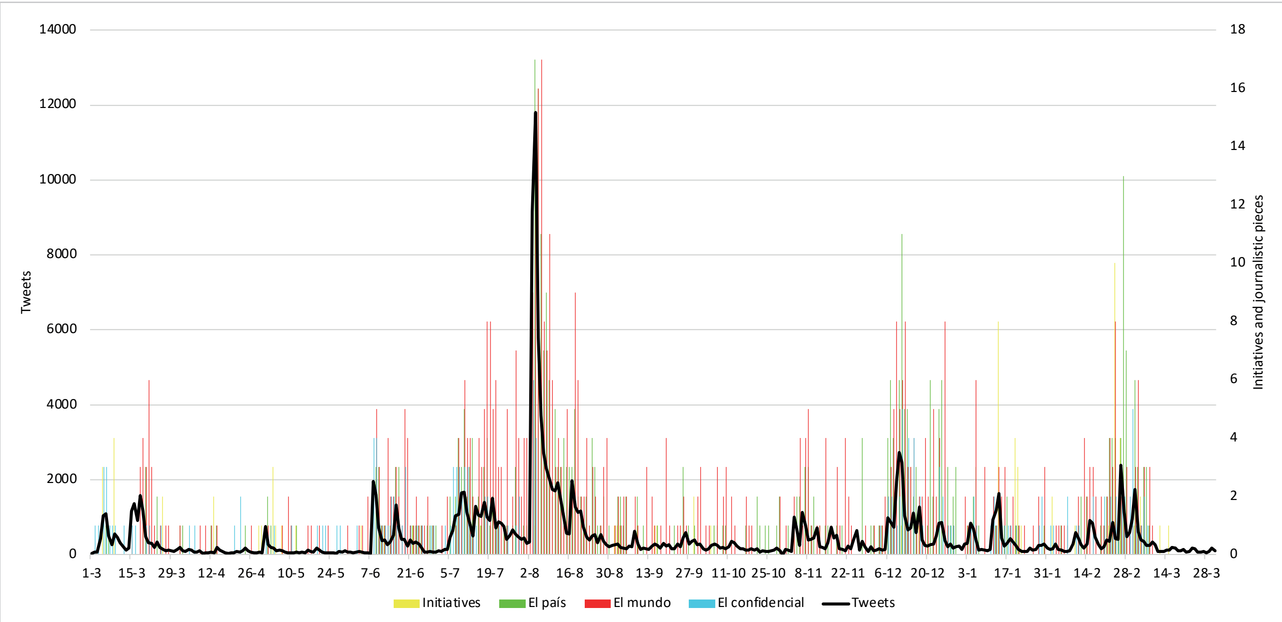
Other peaks of attention occurred in March 2020 (when King Felipe VI renounced his inheritance and cut off his father's allowance), in June 2020 (when the *Prosecutor's Office* opened an investigation into Juan Carlos I's hidden accounts), in July 2020 (regarding the discovery of the second hidden account and the President of the *Government*'s statements) and, subsequently, in November and December (when the regularization with the Treasury had already taken place).

It is evident that the attention from the media and social networks was focused on the expatriation (the most serious personal and professional sanction imposed upon the king emeritus) and on other events associated with public sanction in the professional (being relieved of royal duties) and judicial (*Prosecutor's Office* launching investigations) spheres, as well as in the compensation of damages (regularizing his accounts).

The maximum number of parliamentary initiatives (10) were produced on February 24, 2021, when the *Government* responded to the parliamentarians' questions (particularly those related to the royal household's public spending) all at once. The maximum number of questions from the representatives had occurred a month earlier (in January) when, following the report in *elDiario.es* that Spain's National Heritage agency [*Patrimonio Nacional*] was going to pay the salaries and travel expenses of the staff sent to the United Arab Emirates to attend the king emeritus, the representatives of the *Grupo Plural* and *Bildu* demanded information on this matter.

Both *El país* and *El mundo* synchronized (r = .650; $p \leq$ 000) the release of their news stories and the posting of tweets on the *El mundo* (r = .645; $p \leq$ 000) and *El país Twitter* accounts (r = .633; $p \leq$ 000). The two newspapers highlighted *El confidencial*'s peaks and valleys in interest levels, with *El país* reporting one day later (r = .462; $p \leq$ 000) and *El mundo*, two days later (r = .364; $p \leq$ 000). *El confidencial*, the digital newspaper that published the exclusives about Juan Carlos I, was ahead of the other two newspapers in terms of coverage. This medium was in synch with *Twitter* (r = .466; $p \leq$ 000): in other words, digital and social networks gave attention to the king emeritus at around the same time. Together, tweets and digital headlines set the agenda of the other two newspapers, while the traditional press echoed their ups and downs a day later –*El país* (r = .792; $p \leq$ 000) and *El mundo* (r = .726; $p \leq$ 000).

All of these dynamics took place alongside the parliamentary initiatives. The interinfluence of horizontal oversight and the public (tweets) and published (journalistic pieces) discourse was limited. Only the attention given in *El confidencial*'s



Graph 1. Attention given to the scandal involving the king emeritus over time by *Twitter*, the media, and *Parliament*.

coverage was (slightly) related to the attention given by the representatives two days later. On the other hand, *El país* slightly echoed the interest of the representatives, but three days later (Table 2).

Table 2. Crosscorrelation between parliamentary initiatives, tweets, and news items from *El confidencial*, *El mundo*, and *El país* about the king emeritus

	Parliamentary initiatives				Tweets			*El confidencial*		*El mundo*	
Time lag	***El confi-dencial***	***El país***	***El mundo***	***Tweets***	***El confi-dencial***	***El país***	***El mundo***	***El país***	***El mundo***	***El país***	**SD error**
-7	0.002	-0.025	-0.022	0.004	0.131	0.164	0.260	0.062	0.008	0.162	0.051
-6	0.048	0.013	-0.045	0.001	0.166	0.165	0.283	0.068	0.122	0.175	0.051
-5	-0.027	0.036	0.033	-0.035	0.110	0.161	0.251	0.043	0.051	0.295	0.051
-4	0.113	0.021	-0.032	-0.039	0.121	0.237	0.279	0.105	0.032	0.341	0.051
-3	0.094	-0.013	-0.032	-0.019	0.146	0.271	0.341	0.190	0.141	0.348	0.050
-2	0.163	0.014	0.024	-0.006	0.225	0.281	0.392	0.168	0.146	0.465	0.050
-1	0.071	0.028	-0.010	0.048	0.392	0.360	0.472	0.119	0.152	0.632	0.050
0	0.140	0.084	0.080	0.078	0.466	0.633	0.645	0.307	0.273	0.650	0.050
1	0.084	0.051	-0.007	-0.004	0.227	0.792	0.726	0.462	0.351	0.569	0.050
2	0.049	0.068	0.021	0.025	0.066	0.594	0.659	0.354	0.364	0.481	0.050
3	0.059	0.144	-0.046	-0.026	0.063	0.415	0.499	0.230	0.212	0.455	0.050
4	0.026	0.036	-0.032	-0.020	0.050	0.373	0.367	0.195	0.192	0.351	0.051
5	0.004	-0.038	-0.023	-0.017	0.001	0.314	0.376	0.179	0.170	0.301	0.051
6	0.141	-0.066	-0.046	-0.014	-0.005	0.196	0.300	0.124	0.201	0.267	0.051
7	0.016	0.007	-0.058	0.005	-0.005	0.172	0.194	0.140	0.165	0.284	0.051

4.2. Public (*Twitter*), published (media), and parliamentary frames regarding Juan Carlos I: scandal terms

Table 3 presents the ranking of the most used terms in each speech.

It should be noted from these classifications that the debate was about people but also about institutions:

a) Juan Carlos I, with variations on his name, was the lead. On *Twitter*, the most frequent nickname was “the emeritus” (in 7.53% of the tweets analyzed), a term that the former monarch himself detests (**Justo**, 2002). In the rest of the cases, “Juan Carlos” or “King Juan Carlos” was used (4.6% of the terms from the initiatives, 4% from *El confidencial*, 2.62% from *El mundo*, and 2.22% from *El país*). Only the representatives used “Majesty” in their initiatives. On *Twitter* and in *El confidencial*, “Bourbon” also appeared, which is a derogatory term that carries (somewhat, like “the emeritus”) a sanction in form of the loss of reputation.

b) The second most named person in all debates (except in *Parliament*) was the current king (Felipe VI). In the ranking of terms, this figure came second in *El confidencial* and third in *El mundo*. It was in sixth place in *El país* and in seventh place on *Twitter*. Therefore, the head of state was a co-protagonist in the discussion in the media and among citizens.

c) The different stories made various mentions of politicians. Iglesias (ranked 37th) was more prominent than Sánchez (ranked 47th) on *Twitter*. In the press, however, the opposite occurred: The president came fourth in the ranking of mentions in *El mundo* and eighth in *El país* and *El confidencial*, well ahead of Iglesias. Neither of them appeared in the parliamentary initiatives.

d) Corinna was spotlighted on *Twitter* and also appeared in *El confidencial* (ahead of politicians). Villarejo was also quoted in the media. *El confidencial* also repeatedly mentioned Letizia, Sofia, and Infanta Cristina.

e) Regarding the institutions, the Government occupied the top spot in parliamentary gatherings and online chats, whereas the monarchy did in traditional media stories (second place in *El mundo* and third in *El país*). The *Crown* was in all the media (not in the rest of the stories), but only *El mundo* mentioned it more frequently than the Government (in fourth place).

f) The *Prosecutor’s Office* ranked in the middle for all stories (media, parliamentarian, and social network).

This frequent use of terms allowed us to detect different frames regarding accountability in this scandal:

(a) “Public expenditure” and “commission request” in *Parliament*, which focused the discussion on the budget and inviolability (the emeritus’ private acts were subject to the supervision of the *Government* and, therefore, to the oversight of the courts).

(b) “Exit from Spain,” “millions,” “Felipe,” “Government,” “investigation,” and “Podemos” on *Twitter*, which based the conversation around the lack of punishment for the monarch’s exit from the country, and in *Unidos Podemos*.

Table 3. Classification of terms (translated into English)

El país	Rank	*El mundo*	Rank	*El confidencial*	Rank	Initiatives	Rank	*Twitter*	Rank
Carlos	1	Carlos	1	Carlos	1	Carlos	1	Emeritus	1
Emeritus	2	Monarchy	2	Felipe	2	Majesty	2	Carlos	2
Monarchy	3	Felipe	3	Emeritus	3	Emeritus	3	Spain	3
Government	4	Sánchez	4	Infanta	4	Government	4	About	4
About	4	Emeritus	5	Corinna	5	Request	5	Millions	5
Felipe	6	Corinna	6	Spain	6	Regarding	6	Felipe	7
Spain	7	Spain	7	Prosecutor's Office	7	Commission	7	Now	10
Crown	8	Crown	8	Sánchez	8	Appearance	7	Money	11
Sánchez	8	Government	9	Letizia	9	Stay	9	Government	12
Podemos	11	Podemos	9	Cristina	10	Minister	9	Investigation	13
Larsen	12	Iglesias	11	Government	10	National	9	Podemos	14
Millions	12	Prosecutor's Office	12	Kings	10	Staff	9	Prosecutor's Office	18
Prosecutor	14	Zarzuela	13	Sofía	13	Relationship	9	State	20
Corinna	15	State	14	Bourbon	14	Dhabi	14	Euros	21
Prosecutor's Office	15	Kings	15	Congress	14	Opinion	14	Prosecutor	22
Villarejo	17	Moncloa	16	Prosecutor	14	Charge	16	Monarchy	23
Investigation	18	Pedro	16	Podemos	14	Information	16	Can	24
Kings	18	Congress	18	Monarchy	18	Number	16	Corinna	25
Discourse	20	Father	19	Queen	18	Heritage	16	Switzerland	27
Iglesias	20	All	19	Family	20	Democratic	20	Public	28
Congress	22	Villarejo	19	Infantas	20	Diario	20	Eldiario.es	29
Crisis	22	Crisis	22	Father	20	State	20	Investigate	30
State	22	From	22	Crown	23	Investigation	20	Treasury	31
Investigate	22	Prosecutor	22	Franco	23	Switzerland	20	Congress	32
Swiss	22	Queen	22	Iglesias	23	Audit	25	Corruption	33
Euros	27	Family	26	Investigate	23	Quality	25	Spaniards	34
Investigate [investiga]	27	Investigation	26	Regularization	23	Corruption	25	Title	35
Father	27	Leave	26	Crisis	28	Defense	25	Justice	36
Regularization	27	Millions	26	Money	28	From	25	Iglesias	37
Bank	31	Democracy	32	Euros	28	Existence	25	From	38
Barcelona	31	Politics	32	Week	28	Explain	25	Bourbon	39
Bourbon	31	Sofía	32	Switzerland	28	Prosecutor's Office	25	Republic	40
Account	31	Attack	36	Travel	28	Fight	25	Commissions	41
Debate	31	Cannon	36	Zarzuela	28	Minister	25	Father	42
Treasury	31	Fodder	36	Audience	35	Forecasts	25	Same	43
Switzerland	31	Accounts	36	Castro	35	Public	25	Accounts	44
Zarzuela	31	Defense	36	Five	35	Arabs	37	Fact	45
Colau	39	Partners	36	When	35	Issues	37	Equal	46
Commissioner	39	Supreme	36	Defend	35	Clear	37	Do	47
Executive	39	Friend	43	Elena	35	Things	37	Sánchez	47
Between	39	Attacks	43	Image	35	Cost	37	Supreme	49
Monarch	39	Elena	43	Investigation	35	Emirates	37	Many	50
Reject	39	Spanish	43	Moncloa	35	Exchequer	37	Are	51
Departure	39	Treasury	43	New	35	Exterior	37	Appears	52
Audience	46	Inviolability	43	Urdangarin	35	Outside	37	Commission	53
Cause	46	Justice	43	Villarejo	35	Expenses	37	Until	54
Destination	46	Larsen	43	Visit	35	Geneva	37	Emirates	55
Difficult	46	Christmas	43	Commission	48	Treasury	37	English	56
Donation	46	Pablo	43	Commissions	48	Information	37	Fortune	57

(c) “State” and “Government” in *El mundo* and *El país*, which focused coverage on the political debate surrounding the model of the Spanish State.

(d) And “Prosecutor’s Office” and “justice” in *El confidencial*, which took on the case under the framework of investigative journalism.

Different media outlets were involved in the discussion. Whereas on *Twitter* the most recurrent reference was to *Público* and *Diario.es*, the most common mention in the discussion was of *RTVE*.

4.3. Frames of scandal: public (tweets), published (journalistic pieces), and parliamentary attention by virtue of the prominence of journalistic focus

Table 4 shows the correlations between the different focuses of the scandal related to the King emeritus and public discussion on *Twitter*, in *Parliament*, and in the press.

Coverage of Juan Carlos I leaving Spain (as a kind of punishment) caused attention to skyrocket on social networks (r = .404; $p \leq 000$). Meanwhile, coverage of the oversight of public money and the vindication of the emeritus was linked to the initiatives (r = .762; $p \leq 000$).

In the case of the media, discourse revolved around the individual but also the institution.

The politicization of the monarchy –the positioning of the different forces against or for the king emeritus (r = .666; $p \leq 000$ for *El mundo* and r = .603; $p \leq 000$ for *El país*)– and the decisions and measures adopted by the *Government* (r = .565; $p \leq 000$ for *El mundo* and r = .560; $p \leq 000$ for *El país*) captured the attention of the two traditional newspapers. *El mundo* and *El país* were also the ones that gave the most publicity to the debate on the form of the State (r = .586; $p \leq 000$ and r = .570; $p \leq 000$, respectively).

However, whereas *El mundo* uncovered part of the scandal and corruption plots (r = .400; $p \leq 000$), *El país* placed the controversy particularly within the frame of financial crimes (r = .433; $p \leq 000$), in line with the tax adjustment solution proposed by the *Government*. *El confidencial* dealt with Juan Carlos I’s problems in a multifaceted way, without using the prevailing approach beyond that centered on the actions of the *Prosecutor’s Office*.

Table 4. Correlations between frameworks and agendas

	Tweets	*Parliament* initiatives	*El país*	*El mundo*	*El confidencial*
Politics and government	.419**	NA	.560**	.565**	.282**
Crimes (financial/nonfinancial)	.270**	.211**	.433**	.259**	.339**
Royal families, inheritances, gossip, etc.	.429**	NA	.474**	.555**	.311**
Parliamentary oversight	.181**	.123*	.266**	.181**	.234**
Corruption (plots)	.323**	.116*	.316**	.400**	.274**
International relations	.123*	NA	NA	.145**	.155**
Public expenditure	NA	.762**	.118*	.148**	NA
Prosecutor’s Office	.352**	NA	.390**	.362**	.367**
Model of the State	.401**	NA	.570**	.586**	.132**
Political position	.541**	NA	.603**	.636**	.256**
Departure from Spain	.704**	NA	.486**	.530**	.249**
Historical figure		.374**	.219**	.190**	.136**

5. Discussion and conclusions

The aim of this paper was to make a contribution regarding the role of different formulas and agents in the mechanisms of institutional oversight in democracies.

Our results confirm H1. Despite technically being an unaccountable institution, the Spanish monarchy is unique in that it resembles typical political institutions in the chain of accountability.

In this case, journalists and social networks in particular have acted as accountability agents toward Juan Carlos I, as if he were from an accountable institution. Proof of this is the attention given and the focus with which the scandal has been addressed.

As indicated by **Garrido**, **Martínez**, and **Mora** (2020), this study corroborates that, in contrast to the behavior in previous periods (in which its evolution was very similar to that of the rest of the unaccountable institutions), today the monarchy in Spain in public (social networks) and published (press) opinion lies in the middle ground between the unaccountable and accountable institutions in terms of oversight. In this sense, the attention given to the Swiss Papers scandal, especially by the media and *Twitter*, has subjected the king emeritus, the royal household, and the *Government* to publicity and need for justification of his actions and has made the sanctions public, as if he were from a political institution.

The results consequently support H2. Diagonal oversight has proven to be essential.

> The media, social networks, and *Parliament* have acted as oversight agents for the king emeritus by subjecting him, the royal household, and the *Government* to the publication and need for justification of his actions and exposing him to the threat of sanctions

Public (social networks) and published (media) communication have acted as accountability agents (**Mainwaring**; **Welna**, 2003) by promoting transparency, demanding accountability, and publicizing punishments. It seems that the two major dimensions of accountability described by **Schedler** (1999) and **Cortés-Arbeláez** (2014), that is, answerability (for example, transparency and providing explanation) and enforcement (for example, judicial sanctions, decline in reputation, or loss of employment), were identified by analyzing agendas.

At least as far as public (*Twitter*) and published (press) opinion is concerned, it is clear that the emeritus is no longer protected de facto by the immunity granted to him by the *Constitution* and Articles 490 and 491 of the *Penal Code*, which placed the monarch above reproach (**Ramos-Fernández**, 2013). Online newspapers and *Twitter* have scrutinized his actions, and in light of the attention given by the mainstream press, no self-censorship has occurred (**Lührmann**; **Marquardt**; **Mechkova**, 2020), at least regarding mentioning the scandal.

Tribune de Genève's March 4th coverage of the investigation in Switzerland was the catalyst that alerted Spanish politicians, the media, and citizens to the scandal and set the mechanism for transparency and providing explanations in motion. The press and the social networks' role as watchdogs pushed the royal household and the Executive to justify themselves through their communiqués and statements.

However, the press and *Twitter* have also played an essential role in enforcement (or punishment) –the second of the dimensions of accountability described by **Schedler** (1999) and **Cortés-Arbeláez** (2014)– by focusing peaks of attention around events that could be interpreted as sanctions and making amends.

Thus, the topics covered most intensively have been:

- Felipe VI's withdrawal of the official allowance and privileges in March 2020: a de facto professional sanction,
- The *Prosecutor's Office*'s launch of an investigation into Juan Carlos I's hidden accounts in June 2020: a de facto judicial sanction,
- The harsh statements made by the President of the *Government* in July 2020 upon the discovery of the second hidden account, which furthered reputational harm,
- The publication of the emeritus' farewell letter and his departure from the country, which implied an implicit assumption of responsibility and a personal punishment, and
- Finally, the regularization of his situation with the tax authorities in November and December as a partial display of compensation.

His departure from the country (interpreted by some as an escape and by others as banishment) was the incident that attracted the most attention on *Twitter*, where an intense debate has developed around the expatriation of the emeritus.

Although it has been a topic of great interest for the traditional press as well, they have extensively covered the tax adjustment (which had hardly any appeal for *Twitter*). In particular, *El país*, a media outlet clearly aligned with the institution and the *Government* (**De-Pablos**; **Ardèvol-Abreu**, 2009), has repeated this fact, which months later has become the core argument by which the *Prosecutor's Office* exonerated Juan Carlos I of responsibility.

With respect to the second part of our H2 –that diagonal oversight (exercised by the press and social networks) has been key in the promotion of horizontal oversight, specifically, for the parliamentary oversight of this institution– the quantitative data only partially confirm it. Only *El confidencial*'s coverage is (slightly) related to the attention given by the representatives to the scandal two days later, whereas the other coverage is barely related to parliamentary activity.

This disconnect, as shown by **Martín-Llaguno**, **Navarro-Beltrá**, and **Berganza** (2022), is explained by a dual parliamentary strategy in relation to the monarchy: the *Crown*'s detractors, who have focused on the *Government*'s oversight of public expenditure and corruption, relying, in effect, on the scandals published by digital media, and the parties defending the monarchy, which have been concerned with controlling the image of the emeritus through public television (which has not been analyzed in this study).

The results also allow us to confirm H3. Parliamentary oversight of the king emeritus has been exercised, but it has acted more as a tool for partisan communication than as an accountability tool, making diagonal oversight (media and social networks) more effective for accountability than horizontal oversight (*Parliament*).

> Public (social networks) and published (media) communication have played an essential role in promoting transparency, demanding accountability, and publicizing punishments

The representatives' debate has focused on the launch of commissions of inquiry (unsuccessful) and the oversight of public expenditure. However, the parliamentary agenda has failed not only to achieve its political objectives but also to achieve communicative impact, as it has not been reflected on *Twitter* and has barely made it onto the media agenda. The establishment bubble, with the political positions on the monarchy, has interested traditional newspapers, but not digital newspapers or *Twitter* users.

It could be said that parliamentary oversight of the king emeritus has been more a tool for partisan communication for internal consumption than an effective accountability tool

It could be said that parliamentary oversight of the king emeritus has been more a tool for partisan communication for internal consumption than an effective accountability tool.

We cannot end without mentioning the limitations of and future directions for this work.

First, our study only worked with a sample of newspapers in their online format. It would be worth expanding this to include leading news sources that have been traditionally monarchist (such as the *ABC*) or anti-monarchist (such as *eldiario.es*, *El español*, and *Okdiario*) to see how the results change. On the other hand, it seems logical that it was a digital media outlet *(El confidencial*) that had the exclusive and published the news a day before the rest, which was soon commented upon on social media, which sets the agenda. It would be interesting to analyze other cases in which no media outlet has this privilege to see whether the trend is repeated (whether digital media set the agenda of the traditional media or vice versa and the circumstances on which this depends).

Secondly, a future study that conducts an analysis of the sentiment of the texts from the three agendas and that evaluates the emotional dimension of communication and its effects on accountability is pending.

Thirdly, this study could be extended to observe the evolution of attention, frames, and feelings once the court case is closed and for subsequent events, such as the emeritus's return to Spain.

Fourth, this study's approach has been exclusively quantitative and linked to big data. It has left out other qualitative approaches, which must be addressed. When dealing with agendas, it is important to consider game framing and the discursive analysis of emotional brands in future studies.

Finally, the royal household and the King's family, despite theoretically being removed from political decision-making, are part of an institution with a lot of importance in Spain. In this sense, despite its arbitrary or neutral nature and its technical inability to respond directly (the King's acts being endorsed by the *Government*), the attention it receives from the media, social networks, and *Parliament* could be more related to its importance in Spain than to its nature.

This scandal has yet to be compared with one that affects an accountable institution (for example, a government party) and with one that affects other neutral institutions (the *Constitutional Court*, ombudsmen, or the Armed Forces) to determine what kind of oversight the media, *Parliament*, and social networks will exert.

We leave open a line of work to further explore the different forms of direct punishment imposed by public communication on unaccountable institutions as an unexplored dimension of accountability.

All these issues will be investigated in the near future.

6. Notes

1. Some authors speak of neutral or impartial institutions (**Newton**; **Stolle**; **Zmerli**, 2018); however, we agree with **Garrido**, **Martínez** and **Mora** (2020) that, in cases in which these entities participate in the exercise of power, they should be called unaccountable institutions (such as heads of state, councils of state, or modern monarchies) in the sense that they are not held directly accountable to the electorate for their actions and it is only possible to exercise horizontal oversight (the control of some institutions by others) over them.

2. These are: (a) politics and government; (b) crimes (financial and nonfinancial); (c) royal families, inheritances, and gossip; (d) parliamentary oversight; (e) corruption (plots); (f) international relations; (g) public spending; (h) prosecution; (i) structure of the State; (j) political position; (k) exit from Spain; and (l) historical figure.

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Early career researchers in the pandemic-fashioned ‘new scholarly normality’: a first look into the big changes and long-lasting impacts (international analysis)

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Abstract

After two-years of repeat interviewing around 170 early career science/social science researchers from China, France, Malaysia, Poland, Russia, Spain, UK and US about their work life and scholarly communications in pandemic-times, the *Harbingers* project is now in possession of a mountain of data on what constitutes a very important academic topic. The purpose of the paper is to share the early highlights of the data, with a focus on the main and lasting impacts of the pandemic. The data presented comes from the national interviewers, who had conducted 3 rounds of interviews with their 20 or so early career researchers (ECRs) over two years and, thus, knew them well. They were asked to provide an 'aerial view' by identifying the most important impacts they had detected while things were still fresh in their minds. The main findings are that: 1) ECRs, the research workhorses, have generally proved to be resilient and perseverant and some have prospered; 2) the pandemic has fast-tracked researchers to a virtual and remote scholarly world, with all the advantages and disadvantages that comes with it. The data, however, is nuanced, with significant differences occurring between countries, especially China and France. The paper also updates a literature review on the topic previously published in this journal.

Keywords

Early career researchers; Scholarly communication; Research; Pandemics; COVID-19; *Harbingers* project; Impacts; Pandemic consequences; Interviews; Resilience; Country differences; China; France; Malaysia; Poland; Russia; Spain; UK, United Kingdom; US; United States.

1. Introduction

Upon embarking on the longitudinal, international *Harbingers-2* research project[1], which had at its heart an exploration of the effects of the COVID-19 pandemic on early career researchers (ECRs)[2], we published in this journal an extensive, literature-based exploration of the challenges that were facing them one year or so into the crisis (**Herman** *et al.*, 2021). The host of scientific studies, expert forecasts and personal accounts analysed for the study left little room for doubt: junior researchers were disproportionally affected by the pandemic-incurred hardships, indeed bearing the brunt of the difficulties. So much so, that the 'horror scenario' of pandemic-era ECRs becoming a generation of scientists lost to science was at the time a recurrent feature of the prognostications as to the future of the research enterprise (**Baker**, 2020a; 2020b; **Cardel**; **Dean**; **Montoya-Williams**, 2020; **Christian** *et al.*, 2021; **Harrop** *et al.*, 2021; **Maas** *et al.*, 2020; **Radecki**; **Schonfeld**, 2020).

> Junior researchers were disproportionally affected by the pandemic-incurred hardships, indeed bearing the brunt of the difficulties

Seeking to learn how ECRs have been coping with the sudden-onset, but relentlessly unfolding unprecedented changes in their circumstances, we set out to ask a host of questions regarding the effects of the virus-dictated disruptions on their careers, on the pace/focus of their research undertakings and on their work-life. Almost two years on, with the conclusion of the project already in sight (October 2022), we have empirical evidence-grounded answers to the questions we were asking. Indeed, the data obtained from three rounds (two in the case of Russia) of repeat in-depth interviews, conducted over two years with around 170 sciences and social sciences ECRs from 8 countries, converge to form a multi-faceted portrayal of the effects of the pandemic on the scholarly communication attitudes, practices and work-life of novice academics. Our findings will be systematically reported in a series of articles once the data analysis is completed, but meanwhile we shall share in this article the key insights gained into the pandemic-wrought 'new scholarly normality' as seen through the eyes of ECRs, tomorrow's professors, leading researchers and Noble Prize winners, who, after all, will determine how the future of science will be taking shape.

2. Aim and objectives

The paper provides an early heads-up of what appears to be the major impacts of the pandemic on early career researchers emerging from the *Harbingers-2* study.

It does this by:

(1) Portraying the key features of the country-specific new realities for ECRs, the biggest community of researchers;

(2) Identifying the main impacts of the pandemic (if any) on ECRs' scholarly views, behaviour and work-life in the 8 case study countries –China, France, Malaysia, Poland, Russia, Spain, UK and US;

(3) Establishing how ECRs have been coping with the challenges (if any) of their new circumstances in the countries studied.

(4) Reviewing these early findings in the context of the literature published since our earlier literature review published in this very journal.

3. Context: The *Harbingers* project

The overarching insights reported here come, from the *Harbingers-2 - Early Career Researchers and the Pandemic* research project, funded by the *Alfred P. Sloan Foundation*. The project constitutes a two-year extension (2020-2022) to the original, four-year (2016-2019), longitudinal *Harbingers-1* research project[3], led by *CIBER Research* and funded by the *Publishers Research Consortium*, which explored the working lives and scholarly communication behaviour of junior science and social science researchers in the eight case-study countries.

Harbingers-2 enabled us to continue studying change at a time when the far-reaching effects of the pandemic seem to have brought about unparalleled transformations in the scholarly world, too, as it did in all aspects of life and living everywhere. In *Harbingers-2*, too, the data is drawn from the aforementioned eight countries, but this time covering more ECRs and strengthening coverage of disciplines in the pandemic frontline, such as medicine, economics and psychology.

Harbingers-2, thus, continues to examine, mainly through deep and repeated interviews, the work lives, prospects and scholarly communication behaviour of ECRs, albeit with the express purpose of finding out what the consequences of the pandemic were for the scholarly community as seen through the lens of the new generation of researchers. Guided by this overarching aim, we set out to discover whether the pandemic was speeding up/slowing down millennial attitudes-driven changes, already detected in the pathfinding *Harbingers-1* study, whether it was giving rise to additional and different changes, indeed, whether some changes were going into reverse, which countries were doing what to mitigate the hardships encountered in the scholarly environment, and where, in these circumstances, lay actual practices. No less importantly, we sought to establish whether we were witnessing the need for conservativeness becoming the overriding consideration in steering research initiatives and, as such, an inescapable imperative for those who manage to enter the system, or, alternatively, whether we were on the cusp of disruptive developments in the scholarly undertaking, which may bring about far-fetching changes in scholarly attitudes and behaviours.

Critically, the longitudinal nature of the project meant that we were not merely taking a snapshot of a major transition in the scholarly environment, but following and monitoring the process at the grass roots level in order to find out what the new scholarly 'normal' will look like and how the future of science and scholarship appears to be taking shape.

4. Literature review

The process of becoming a full-fledged member in the scholarly community had been a lengthy and gruelling one long before the pandemic became a central force in shaping our lives (**Bennion**; **Locke**, 2010; **Brechelmacher** *et al.*, 2015; **Castellacci**; **Viñas-Bardolet**, 2020; **McQuarrie**; **Kondra**; **Lamertz**, 2020; **Petsko** *et al.*, 2014; **Powell**, 2015; **Vatansev-**

er, 2020). Indeed, in many countries it has forever been the lot of an ever-growing cohort of newly-minted PhD holders, aspiring to win the tight race for the limited numbers of permanent academic positions available, to travel a 'rocky road to tenure' (**Brechelmacher** *et al.*, 2015; **Maher**; **Sureda**-**Anfres**, 2016; **Roach**; **Sauermann**, 2017; **Xing** *et al.*, 2019). With the advent of the pandemic-generated global economic crisis, which brought about further financial stress for Higher Education (HE) institutions worldwide (**Baker**, 2020a; **Lederman**, 2021; **Radecki**; **Schonfeld**, 2020; **Ross**, 2020; **Thatcher** *et al.*, 2020; 2020), things did not bode well for academics.

> The data obtained from three rounds of repeat in-depth interviews, conducted over two years with around 170 sciences and social sciences ECRs from 8 countries, converge to form a multi-faceted portrayal of the effects of the pandemic on the scholarly communication attitudes, practices and work-life of novice academics

The developments on the ground soon proved the gloomy outlooks to be realistic enough. The pandemic has profoundly affected the university sector, bringing about, as it did, loss of revenue from fees paid by international students and reduced funding by governments, which worsened pre-existing problematic work-conditions, such as stagnant wages, toxic work environments, bullying and a lack of regard for staff safety and well-being (**Gewin**, 2022; **McGaughey** *et al.*, 2021). It is hardly surprising to find then that fewer than half of the 3200 respondents to *Nature*'s *2021 International Salary and Satisfaction Survey* reported feeling positively about their career prospects, just 47%, compared to 59% of researchers in 2018, a finding that has been traced back to widespread funding shortages, intense competition for jobs and the disruptions of a global pandemic (**Woolston**, 2021a).

Indeed, 12% of respondents said they had already lost a job offer because of COVID-19, and 43% said that the pandemic had negatively impacted their career prospects (**Woolston**, 2021b). Tellingly, respondents in industry (64%) were much more likely than those in academia (42%) to be optimistic about their future (**Woolston**, 2021a). No wonder then, as **Gewin** (2022) reports, that higher education has not escaped the 'great resignation' –the international wave of worker resignations that began in 2021, including a record 47 million US residents and 2 million UK adults. Beyond the aforementioned financial constraints, it was universities' expectations during the pandemic for 'the same and more' from struggling staff members, which, having sparked a widespread re-evaluation among them of their careers and lifestyles, spurred on a wave of departures.

ECRs, well-aware that employment problems were looming to an even greater extent on their already precarious horizons, were very concerned indeed that the pandemic-triggered financial problems in the academic world were endangering their career prospects (*AAS - EMCR*, 2020; **Baker**, 2020b; **Byrom**, 2020; **Morin** *et al.*, 2022; *SMaRteN*; *Vitae*, 2020; **Watchorn**; **Heckendorf**; **Smith**, 2020; **Woolston**, 2020; **Yan**, 2020). With good reason, too: after all, junior researchers, being typically employed on fixed-duration, non-tenure track contracts, as they are, certainly were the most vulnerable cohort in the research community, particularly prone to hiring freezes, layoffs and dearth of job openings that the pandemic was predicted to bring about. Indeed, the literature of the early days of the pandemic focussed on the almost insurmountable challenge that securing a share of a decreasing academic pie posed to novice researchers, with the aforementioned threat of their becoming a generation lost to science cited again and again (**Baker**, 2020a; 2020b; **Cardel** *et al.*, 2020; **Christian** *et al.*, 2021; **Harrop** *et al.*, 2021; **Maas** *et al.*, 2020; **Radecki**; **Schonfeld**, 2020).

Subsequent developments proved the despondent prognostications as to ECRs' circumstances in pandemic-era academe to be accurate enough, as the results of the aforementioned *Nature*'s 2021 international salary and satisfaction survey indicate. Junior researchers did turn out to be especially vulnerable, with more than half (53%) of ECRs, including 65% of all postdoctoral researchers, reporting that the pandemic had hampered their prospects, as compared to 39% of researchers in the later stages of their careers (**Woolston**, 2021b). Predictably, perhaps, for all of the biggest barriers to career progression, identified in the survey (**Woolston**, 2021a), must pose even more of a challenge for ECRs: thus, for example, competition for funding, the gravest concern of them all, certainly puts researchers with an as yet less impressive track record of publications at a disadvantage, as does, another important concern cited, the lack of appropriate networks/connections, which, obviously, is more characteristic of the circumstances of novice academics.

Doing research in a pandemic-disrupted world: the case of ECRs

The enormity of the challenges that COVID-19 posed to ECRs truly came to the fore once attempts to fend off the pandemic through measures of social distancing, which morphed from time to time into nation-wide lockdowns, were put in place. Arguably, as some of the tasks comprising scholarly work can be undertaken remotely and/or anywhere (as long as there is a laptop available for the purpose), researchers could have been considered luckier than many. In any case, having no say in the matter, just like anybody else, work from home they did when they had to, juggling research and domestic activities as best as they could.

> It has forever been the lot of an ever-growing cohort of newly-minted PhD holders, aspiring to win the tight race for the limited numbers of permanent academic positions available, to travel a 'rocky road to tenure'

True, for many researchers working from home had its advantages, the greatest of which was the ability to devote their time to a lot of desk work: data analysis, reading, writing –papers and/or grant applications. Not having to commute was cited as another advantage, as was the absence of 'office distractions' when working in one's own space. The flexibility afforded by the practice of working from home was for some researchers, most notably for those with caring responsibilities, a considerable benefit, too, especially as it was seen as affording greater autonomy in working arrangements (**Korbel**; **Stegle**, 2020; **Rijs**; **Fenter**, 2020; **McGaughey** *et al.*, 2021; **Woolston**, 2020).

> The pandemic worsened pre-existing problematic work-conditions, such as stagnant wages, toxic work environments, bullying and a lack of regard for staff safety and well-being

However, working from home was not for everybody, with the difficulty to concentrate at home and technical problems –organising remote teaching is a case in point– most often reported as hindering progress in research work (*AAS - EMCR*, 2020; **Baker**, 2020b; **Byrom**, 2020; **Baynes**; **Hahnel**, 2020; **Korbel**; **Stegle**, 2020; **McGaughey** *et al.*, 2021; **McGaughey** *et al.*, 2021; **Minello**; **Martucci**; **Manzo**, 2020; **Radecki**; **Schonfeld**, 2020; *SMaRteN*; *Vitae*, 2020; **Watchorn** *et al.*, 2020; **Woolston**, 2020). It certainly was not for those whose pursuits involved laboratory or field-based work; thus, for example, the above-noted *Nature Survey* found that the majority of respondents (57%) said that the pandemic had impaired their ability to collect data and a similar proportion (55%) said so with regard to conducting laboratory-based experiments (**Woolston**, 2021b).

Interestingly, the attempts to sidestep the pandemic-enforced onus 'to shelter at home', through an accelerated shift in the scholarly world to online work, were accorded a mixed reception (**Watermeyer** *et al.*, 2020). Thus, whilst some researchers enthusiastically supported the practice of going virtual for teaching, collaborating, cooperating and networking, citing its cost –and particularly its time– saving properties (**Korbel**; **Stegle**, 2020; **McGaughey** *et al.*, 2021; **Olena**, 2020; **Weissgerber** *et al.*, 2020), others lamented the unsuitability of online communications to support the socialising and networking which are –as they should be– an inherent component of meetings and conferences (**Kwon**, 2020; **McGaughey** *et al.*, 2021; **Watchorn** *et al.*, 2020; **Weissgerber** *et al.*, 2020).

With the restrictions thus wreaking havoc with researchers' customary practices of working to the extent that they did, going about doing research as per usual did not seem a likely possibility. A daunting prospect indeed for any scholar, but especially so for ECRs, whose admittance as full-fledged members to the research community is forever contingent on an impressive track record of research achievements, most notably as measured by papers published in prestigious and high-ranking journals (**Hangel**; **Schmidt-Pfister**, 2017; **Hollywood** *et al.*, 2020; **Müller**, 2014; **Nicholas** *et al.*, 2015; **Nicholas** *et al.*, 2017; **Nicholas** *et al.*, 2020).

Indeed, ECRs seemed to be hit particularly hard. Thus, for example, for them, as yet relatively inexperienced and less-well-connected researchers, the inability to meet with their lab head and colleagues posed a greater hardship, as did the bans on travel that brought about a lack of networking and cooperating opportunities (**Byrom**, 2020; *SMaRteN*; *Vitae*, 2020; **Woolston**, 2020). The burden incurred by the pandemic-enforced migration to remote teaching, with its host of practical, technical and pastoral challenges, also increased the likelihood of teaching impinging on the time and energies ECRs need to address the all-important demands of their research work (**Aubry**; **Laverty**; **Ma**, 2021; **Gates**; **Gavin**, 2021; **Górska** *et al.*, 2021; **Harrop** *et al.*, 2021; **Minello** *et al.*, 2020; *Vitae*, 2020; 2021; **Watchorn** *et al.*, 2020; **Watermeyer** *et al.*, 2020; 2021).

However, with life slowly assuming a semblance of normality, although it may very well turn out to be a new, much more online normality, the initial effects of the pandemic on researchers seem to be wearing off. Thus, for example, a comparison of the findings of two surveys, conducted in two different stages of the pandemic –April 2020 and January 2021– among US and European-based researchers, indicates that a considerable change has taken place in their pursuits over the time-range studied. Thus, by January 2021 the amount of time they were spending on their research had almost returned to pre-pandemic levels, with paper submissions and publications appearing to be holding steady, if not on the rise. However, they were found to have pursued fewer new projects in 2020, suggesting that they may have been working on established topics, writing up existing research, writing more grant proposals and revisiting old data (**Gao** *et al.*, 2021). The writing on the wall thus seems clear: the scholarly world may be recovering from the pandemic, but the long-term effects of the transformations that occurred in the virus-ruled years are yet to be seen, as are the impacts of these transformations on the academic community in general, and the ECRs, among them, in particular.

5. Methodology and data analysis

The *Harbingers-2* project continues the mixed methodology approach of *Harbingers-1*, as detailed in **Nicholas** *et al.* (2019; 2020) and on the project website[3], as it provides for a high-degree of data triangulation: an ongoing literature review to supply context, deep, open-ended interviews and a follow-up questionnaire survey. The findings reported here, however, represent the key insights coming from 3 rounds of interviews, held at 6-month intervals over two years.

The sample population comprises both ECRs who participated in *Harbingers-1*, and new ones, recruited to fill the ranks of participants who have left research or no longer qualify as ECRs (e.g., because they obtained tenure). ECRs were recruited by the eight national interviewers, utilizing their local networks and connections, with numbers supplemented by mail-outs from scholarly publisher lists. Each national interviewer was provided with a quota of interviewees in order to achieve a measure of representativeness from age, gender and subject point of view, and to ensure that the demographics of national samples are as similar as possible. The recruiting target was between 20 and 24 interviewees per country. The project began with 177 ECRs and finished with 167 (a 6% attrition rate).

> For many researchers working from home had its advantages, the greatest of which was the ability to devote their time to a lot of desk work: data analysis, reading, writing –papers and/or grant applications

The interview schedule[4] contained 54 questions, a mix of closed, open and hybrid ones, covering a wide range of topics: the impact of the pandemic on ECRs' job, status, career aims, assessment, research directions and working life, as well as their views of transformations yet to come in the scholarly enterprise. Essentially, it was an open-ended conversation, guided and punctuated by more direct questioning (i.e., semi-directed), conducted remotely over *Zoom* and similar platforms (because of the pandemic), in each ECR's national language, except in Malaysia where English is widely used. The interviews, typically 75-120 minutes in duration, were recorded, with the transcripts returned to ECRs to ensure accuracy/agreement and to obtain further clarity.

Following the ECRs' approval of the interview transcript, a summary was prepared by national interviewers, which included:

(a) coded classification of responses to questions, where applicable, which fitted a five-point scheme, labelled in its generic form: Yes; Maybe yes; Don't know; Maybe no; No;

(b) direct quotes and/or paraphrases of the ECRs' responses, when provided;

(c) interviewers' comments, clarifications and contextualisation of what has been said when provided.

The per-interview synopses were then consolidated into a single matrix for each of the three rounds of interviews, which, taken together, form the data base of the entire study.

The analysis of the mountain of data obtained in the interviews, whilst already underway, will obviously take time, but the overarching impacts and themes emerging from the vast body of information that we have are already clear. Indeed, after two years of intensive exploration of ECR life under the terms of the 'new scholarly normality' in their respective countries, the team of national researchers are best placed to identify the main developments on the ground as they were unfolding throughout the pandemic. Thus, the findings reported here are essentially the empirical evidence-based key conclusions that the 8 national interviewers came up with when reflecting on the vast body of information provided over the past two pandemic years by the ECRs in three repeat rounds of interviews.

Finally, it is important to note that our case study countries are reasonably representative, including, as they do, the most renowned scholarly communication players (the UK and the US), the most populated country in the world (China), countries from three continents (Asia, Europe and North America) as well as big and small countries (Russia, Poland and Malaysia).

6. Results and discussion

The remit then, for each national interviewer was to identify what the main impacts of the pandemic had been (if any) on ECRs' careers, on the progress of their research undertakings and on their work-life, to predict whether any of the impacts so identified might turn out to be passing or permanent, and to state how their country cohort, as a generation, could be characterised, with the 'lost' generation in the back of their minds. Having been given freedom to describe the local situation as they saw fit –after all, they live in the same country as their interviewees and are researchers in their own right– the national interviewers were, nevertheless, asked to look at what other countries had said in order to jog minds, to standardise responses and provide comparative statements.

Mindful of the different measures adopted in the different countries to mitigate the impacts of the pandemic and, therefore, seeking to provide a comparative framework to the findings, we have adopted a stringency index to aid us in explaining different country outcomes. The index we used for this purpose –*The Oxford Coronavirus Government Response Tracker* (*OxCGRT*)[5]– is a composite measure of nine of the response metrics: school closures; workplace closures; cancellation of public events; restrictions on public gatherings; closures of public transport; stay-at-home requirements; public information campaigns; restrictions on internal movements; and international travel controls.

As we have seen, early evidence on ECR life under the virus-dictated rules pointed to a rather disheartening state of affairs. ECRs, as the cohort that is particularly prone to the detrimental effects of the pandemic's putting the brakes on productivity, collaboration and cooperation, were busier than ever and justifiably concerned about their career prospects. However, by now the research environment in our study countries has been re-assuming a semblance of normality, except in China, where some of the strictest epidemic prevention and regulation policies in the world are still in place. Still, as the portrayal of the impacts shows, it is, in many respects, we are returning to a new normality, which, importantly, is by now firmly embedded in the scholarly enterprise and looks as if it is here to stay.

In understanding the following country analysis, we need to bear in mind that, as we have noted earlier, that the national interviewers were not provided with a template or list of potential impacts, but instead, complete freedom as to identify what the big impacts were for their ECRs. This means that each country entry –provided here in alphabetical order–, is organised a little differently, which gives each country its individual character. However, for all countries is furnished: 1) A pandemic stringency statement; 2) Main impacts; 3) Possibly permanent changes; 4) A characterisation of the ECR cohort as a generation.

6.1. China

6.1.1. Pandemic background

The *Oxford stringency index* shows China to have the highest stringency score of all the case study countries and it is still rising, unlike in the rest of the world, a state of affairs that, as we shall see, has had a huge impact on ECRs in the country.

6.1.2. Main impacts/changes

Working from home
This is the biggest impact. Using the internet for remote work and teaching is widespread, as is the use of mobile phones and tablets to search, read literature; all part and parcel of ECRs' work practices. Although the benefits of virtual teaching are doubtful, everyone has become accustomed to it. There are still a lot of researchers working from home. In fact, domestic travel, even to places of work, is still difficult. Inefficiency and "burnout" are the consequences of this.

Productivity/publishing
Some ECRs have adjusted their research directions (and paper publishing) to the pandemic to serve society and appear worthwhile. Hopefully, it is thought, that it will be easier to publish their research. There has been no growth in open access (OA) submissions because of the pandemic, but green OA practices are on the up, which is interesting because such practices are not popular in the other case study countries.

Virtual meetings and conferences
With international, and often in-country travel bans in place, online conferences and meetings are the norm and generally accepted.

Networking/collaboration
For more than two years, China has experienced not only the COVID-19 pandemic, but also the strictest epidemic prevention and regulation policy in the world. Even now many areas of China are still under lockdown, occasionally quarantined, and travel bans are rife. This strict management has effectively stopped the spread of the virus, but the entire country's economy, technology, and culture –and, in consequence, it is universities and staff– have been hit hard. International travel and face-to-face communication have completely stopped, and many laboratory reagents, samples, and equipment that must be imported from abroad cannot be easily obtained. Plainly, then, it is challenging to build new collaborations, but already-built partnerships continue.

Preprints
There has been more use/publishing of pre-prints, helped by the building of *ChinaXiv* funded by the *Chinese Academy of Sciences*
http://chinaxiv.org/home.htm?locale=en

Outreach
Outreach is still not practised much, but ECRs are thinking about it more now and is expected to increase.

Re-evaluation of what is important in life
The considerable uncertainty brought about by the pandemic has made everyone, including academics, rethink their work and life. Some ECRs no longer regard work as a priority and pay more attention to their health and family. Some are more devoted to their work, hoping to make more significant contributions to society through their research.

Pursuing an academic career
In general, young people face fewer job opportunities and immense competition, and they often have to work harder than their predecessors to maintain a standard of living. For some young people, no matter how hard they try, they cannot reach their predecessor's work achievement and standard of living. However, the work of ECRs has not significantly been affected by the pandemic compared to other professions in China. No one has lost a job, and no one has withdrawn from scientific research.

Country-specific impacts
In China the political and economic impacts of the pandemic have hit academe hard. Changes to scholarly communication behaviour have been dwarfed by huge societal and political currents. Complicating things further, China has become detached from the other parts of the scholarly world in the wake of the confrontation

"In China, international travel and face-to-face communication have completely stopped, and many laboratory reagents, samples, and equipment that must be imported from abroad cannot be easily obtained"

between China and the United States. So much so, that ECRs generally feel that Chinese academics' foreign colleagues, reviewers, and journal editors are reluctant to engage with them.

6.1.3. Possible permanent changes

1. Online communication and teaching will partly replace face-to-face academic communication and teaching.
2. ECRs will be even more stressed than before because of their increasing vulnerability in an already highly pressurised and isolated environment.
3. The gap/misunderstanding/difference between China and the West will widen, perhaps not become permanent, but will last for a decade or so, seriously disrupting scholarly communication and collaboration.

China has become detached from the other parts of the scholarly world in the wake of the confrontation between China and the United States. So much so, that ECRs generally feel that Chinese academics' foreign colleagues, reviewers, and journal editors are reluctant to engage with them

6.1.4. Characterisation of cohort

A resilient generation.

6.2. France

6.2.1. Pandemic background

According to the Oxford stringency index, until quite recently (11 March 2022) France was one of the most stringent countries and getting more 'stringent' (higher than China on March 11) until recently. Seemingly, as a consequence, impacts tend to be big and controversial.

6.2.2. Main impacts/changes

Working from home
The biggest impact. In the post-pandemic period remote working is widespread, indeed, the norm. Online activities (teaching, seminars etc.) have gone back to normal, but online meetings have become commonplace.

Virtual meetings and conferences
Whilst teaching, conferences and seminars are again held face-to-face, online meetings have become commonplace. Hybrid scenarios are thought not to engender the engagement of the participants and attendees.

Outreach
Outreach is the activity that all researchers want to be involved in but few do it, even with the example of the pandemic firmly in their minds. However, what they thought of as being outreach changed in between interviews and became more positive towards it. Thus, while during the first round of interviews, outreach was seen as an emergency activity to help the public to understand science and to fight fake news, by the second round of interviews outreach became more of an activity aimed at finding some meaning in a meaningless world. Outreach was thought to be at the opposite end of the publish or perish credo on the publishing spectrum, and, as such, the place to be. In fact, some of ECRs tried to find jobs in this area, given that current French policies are very favourable towards outreach. Most importantly, even those ECRs who are not engaged in outreach wish they could do so, and those who do it, are doing it in many ways, even by threads on *Twitter*. Certainly academics, who typically judge outreach to be a marginal component of the research undertaking, need to realise that ECRs do not see it that way.

Re-evaluation of what is important in life
The pandemic made an already precarious position even more precarious for French ECRs, hitting them where they are most vulnerable. Indeed, for the majority of ECRs the pandemic just added to a long list of problems they were already facing – the prevailing scarcity of tenured positions, budget cuts and the reforms of the *Higher Education Minister*, which made their employment situation even more precarious and increased the scarcity of permanent positions. No wonder that the two months of total lockdown was very hard on the French cohort and made them sit-up and think. During this period, reflections and introspections focused on the importance –the urgency for some– of finding stability: finding a stable job that would guarantee the serenity and quality of a sedentary life, supposing such a job existed. They sought refuge from the pandemic storm.

Pursuing an academic career
Hardly surprisingly then, the French cohort saw a greater number of ECRs leave the system and the project (15% compared to about 5% in the other countries).

> In France whta they thought of as being outreach changed in between interviews and became more positive towards it. Thus, while during the first round of interviews, outreach was seen as an emergency activity to help the public to understand science and to fight fake news, by the second round of interviews outreach became more of an activity aimed at finding some meaning in a meaningless world

So, their behavioural change could not have been bigger –they simply left so they were not in the firing line. Those who gave up the race for academic positions have gone into industry, private Catholic universities or into under-qualified positions intended to support research. However, they all hope to return at some point to academic research, and maintain their publishing activity as an insurance policy.

The pandemic has brought about an unexpected and unwelcome outcome in France: a class divide has been opening up –tenured seniors work distantly and junior researchers come into work. Indeed, distant working has become a new mark of distinction

Country-specific impacts

The greater acceptance of working from home as a consequence of the pandemic has brought about an unexpected and unwelcome outcome in France: a class divide has been opening up –tenured seniors work distantly and junior researchers come into work. Indeed, distant working has become a new mark of distinction, a demarcation line between the haves and the have-nots, with novice researchers left feeling abandoned by their senior colleagues. Making things even worse, many ECRs feel that OA is introducing a new inequality between researchers, labs and countries, because it is up to the senior researchers, who hold the academic purse strings, to pay (or not) for publishing in OA or hybrid journals.

Another development characterising France, although not unique to it, is that *Sci-Hub* has become an inherent component of the new normal, so much so, that it has partly usurped the library. ECRs mention it as one of the resources they use daily for their work –on their scholarly dashboard in other words, although they do claim to use it only as a last resort. They certainly do not regard the use shadow libraries as unethical, and, in any case, for them the end justifies the means.

6.2.3. Possible permanent changes

1. The normalisation of distant working for researchers has created an atmosphere where physical presence is synonym for precariousness and distance is synonym of privilege. Besides, efficiency of work, agility and flexibility is less present in the labs where there are many people who are working distantly, which means that in some places, it affected the quality of work.

2. Online meetings are now completely embedded in the daily working life, without any distinction between topics that deserve physical meetings and those that can be dealt with online.

6.2.4. Characterisation of cohort

A resilient generation, bends without breaking and unnerved by events and increasingly protesting and revolutionary.

6.3. Malaysia

6.3.1. Pandemic background

Currently Malaysia shows the second highest Oxford stringency score after China, another Asian country and one where there have been many changes.

6.3.2. Main impacts/changes

Working from home

To slow the transmission of the virus and ease the burden of the health system, the *Ministry of Higher Education* included university closure as part of the physical distancing policy. Mental stress is often cited among academics in Malaysia who have had to migrate to online learning, and this also true of Malaysian ECRs, who teach. Those with caring duties, a high teaching workload –and hence, the need to shift to remote learning– and administrative obligations had the greatest problems, but not for long. Certainly ECRs have proven that they are built to handle stress, have coping mechanisms, and are resourceful. They now rely heavily on the use of web conferencing-based remote learning tools for synchronous teaching, subscribed to by the universities, such as *Zoom*, *Webex* and *Microsoft Teams*. Remote work has definitely become the norm.

Productivity/publishing

There are very little signs of scientific research being significantly disrupted during the pandemic –only those with lab work were really affected. In fact, for most, working from home made some scholarly tasks easier, for instance, working on grant applications, writing their thesis or research reports, and publishing journal articles. ECRs felt this was the time to be extremely productive, and were hopeful that there would be flexibility to work from home even after the worst of the pandemic is over. Those few ECRs, who were not able to conduct some of the research planned under the terms of their grants, were able to change the methodology or replace the content and satisfy their funders. Most were remarkably resilient and resourceful. Those who had been producing fewer research outputs, were also quite confident that they would be able to secure a permanent post once they fulfilled the publication requirement by the end of 2021. At present, academics are back on campus, working on site, as there are concerns that there would otherwise be losses in productivity for those with caring, teaching and administrative demands if working from home continues.

In Malaysia, those with caring duties, a high teaching workload –and hence, the need to shift to remote learning– and administrative obligations had the greatest problems

Virtual meetings and conferences
Most ECRs, by now customarily working online and communicating remotely, say that they will shift to online conferences because it saves time and travel-related expenses, which, as a rule, are not covered by their institutions for contract staff.

Pursuing an academic career
Academic tenure is what Malaysian ECRs are aiming for, even the post-doc and doctoral students are not open to different career path. Most are confident of job security and career development if they produce the requisite publications in IF-journals. Their views of IF-factored journals as the gold standard in publishing have not changed because of the need to achieve their KPI (key performance indicator). A few were even hired during the pandemic, because they had *Web of Science*-indexed publications in their CV. At the end of the third round of interviews, more than 15 ECRs have secured a permanent post and another two completed their PhD studies and were offered a research contract.

> Malaysians' views of IF-factored journals as the gold standard in publishing have not changed because of the need to achieve their KPI (key performance indicator). A few were even hired during the pandemic, because they had *WoS*-indexed publications

Country-specific impacts
The implementation of the *Movement Control Order* in March 2020 resulted in universities fully switching to online learning. As a result, higher education in Malaysia has changed dramatically with a very distinctive rise in online learning, where teaching is conducted remotely on digital platforms. Even though the government has allowed universities under the *Higher Education Ministry* to reopen the campus in stages from March 1 2022, the institutions must have the required space to accommodate physical classes with strict adherence to the standard operating procedure for teaching and learning sessions and allowed to conduct the sessions in a hybrid manner or online.

6.3.3. Possible permanent changes

1. The big (positive) long-term impact is the use of online platforms and digital tools that make ECRs feel connected to their research team; working remotely continues and becomes the new norm.

2. Remote learning and hybrid classrooms the norm. Academics are at different points in their comfort and skill-set with remote teaching, and universities are cultivating a culture of improvement that would benefit both their students and the faculty.

3. Most ECRs have established a habit of working online and communicating remotely and will shift to online conferences because it saves time and travel-related expenses. They opt for online because they do not have access to institutional funding that covers the registration fees and the other expenses involved (travel, accommodation).

4. The competitive academic environment means researchers need to engage in active self-branding (visibility) to build their reputations and this is seen among Malaysian ECRs –using *LinkedIn* to build their online narrative and adding publications, projects and other research-related outcomes.

6.3.4. Characterisation of cohort

A resilient (and resourceful) generation.

6.4. Poland

6.4.1. Pandemic background

Poland, according to the Oxford stringency index was the least disrupted of all our case-study countries and this partly explains why, as we shall see, Polish ECRs have been impacted the least out of all the case study countries. Indeed, Polish ECRs had relatively little to say on the effects of the pandemic on their scholarly view, practices and work-life.

6.4.2. Main impacts/changes

Working from home
The pandemic brought about an increased and rapid spread of remote forms of teaching in Polish universities (mainly using *Teams*, but also *Google Meet*/*Zoom*/*Webex*).

Productivity/publishing
ECRs found remote learning and teaching more convenient and time-saving (for, instance, by a reduction in the time spent commuting to the university). Thus, as they pointed out, they could spend more time on research, which would hopefully improve productivity.

Virtual meetings and conferences
A direct effect of the pandemic was the growing prevalence of remote meetings: seminars, team meetings, examination boards and conferences. However, opinions

> Poland, according to the Oxford stringency index was the least disrupted of all our case-study countries and this partly explains why Polish ECRs had relatively little to say on the effects of the pandemic on their scholarly view, practices and work-life

are divided with regard to the shift to virtual meetings, with some ECRs preferring online communication whilst others –face to face.

Networking/collaboration
Some ECRs used the time they were forced to spend at home to take greater care of their 'business cards' on the web, e.g., their profiles and accounts on various media/ services/ platforms, to promote themselves and obtain visibility in the scholarly community.

Country-specific impacts
Polish ECRs were *reluctant to answer directly* questions related to the impact of the pandemic, probably because they did not feel the impact of the pandemic on their work at all, other than, of course, where it came to remote teaching and virtual conferences and meetings. Some of those who worked in laboratories or did field work noted delays in their research (approximately six months due to lockdowns). Moreover, by the time of the third interview, when the war in Ukraine broke out, the concern about it seemed to have replaced the worries (if any) regarding the pandemic, to the extent that the pandemic became unimportant.

6.4.3. Possible permanent changes

1. Due to the convenience and familiarity with *MS Teams*, *Google Meet*, *Zoom*, *Webex*, etc., time will be saved which will lead to increased research productivity.

2. More remote classes offered by educational institutions will help ECRs who are studying for their doctorates as well as those teaching students.

3. Hybrid conferences may turn out to be the best of both worlds.

4. ECRs who were not using *MS Teams*, *Google Meet*, *Zoom*, *Webex*, etc., prior to the pandemic will continue to use them to some extent when connecting with colleagues and potential and existing collaborators.

5. More researchers are likely to care about their online visibility.

6.4.4. Characterisation of cohort

A resilient generation.

6.5. Russia

6.5.1. Pandemic background

Russia initially reacted strongly to the pandemic then then scaled down quickly and, as a consequence, things are very much back to normal, aside from remote working although the conflict in Ukraine means that conference attendance and international collaboration is proving difficult, meaning quite a long period of isolation for many ECRs.

6.5.2. Main impacts/changes

Working from home
At its onset, the pandemic posed many challenges for Russian universities and researchers, most notably because of the need to re-organise work and teaching. Coping with colleagues falling ill was stressful and affected work, for the same amount of work had to be done despite colleagues' absences. However, towards the end of the pandemic universities learned to cope and ECRs have adapted to the situation. Beyond that, by now work, communication and teaching are again done face-to-face. Still, the one big change, which might in the end turn out to be permanent change, is the normalising of hybrid working and communication: working from home, hybrid conferences, online meetings and lectures, using digital services.

Productivity/publishing
Research directions have not changed though, with most ECRs reporting no changes in duties or roles due to the pandemic.

Virtual meetings and conferences
The ban on travel posed a significant challenge to Russian scientists, who were used to actively participating in international conferences before the pandemic.

6.5.3. Possible permanent changes

1. Hybrid conferences are here to stay.

2. Research institutions will be more accepting of working from home.

3. Online meetings will become a normalised.

6.5.4. Characterisation of cohort

A resilient generation.

6.6. Spain

6.6.1. Pandemic background

Spain never occupied a place at the top of the stringency index and is currently the 3rd least stringent.

6.6.2 Main impacts/changes

Working from home

In the case of Spanish ECRs, the main impacts of the pandemic in its first year were the strict restrictions on travelling and the lockdowns. In the main it affected researchers at universities because they had to change their teaching methods to serve distance students. This situation required a significant extra effort, which meant less research done. However, since then in some institutions face-to-face teaching was slowly reinstated, often as one option afforded by a hybrid teaching system. Thus, face-to-face (masked) and virtual classes were conducted in parallel, with some students attending in person while others followed the classes from home. The hybrid system was very demanding for ECRs who taught. For doctorate students it was a problem not having the opportunity of visiting other universities abroad, which is integral to their studies.

In the case of Spanish ECRs, the main impacts of the pandemic in its first year were the strict restrictions on travelling and the lockdowns

Productivity/publishing

The impossibility of carrying out field work and the restrictions in laboratory work delayed the collection of new data, but working from home also allowed for greater concentration on work, not wasting time traveling, writing pending papers and publishing more. So, things evened up. By now, with the restrictions almost completely lifted, field and laboratory work are almost back to pre-pandemic times. Publishing open access has become the default way of publishing for most ECRs in Spain –it has become normalised and the pandemic has helped in this. Everyone is positive about sharing data, but this practice has not yet fully penetrated the cohort.

Virtual meetings and conferences

By the current academic year, the situation has normalised, but online meetings and hybrid conferences continue. Holding meetings of all kinds online is here to stay. Everybody has become familiar with *Zoom*-type platforms and it is evident that they can successfully replace trips costly in time and money. Many courses and conferences will continue to use the hybrid format that makes it easier to attract attendees.

Preprints

The popularity of preprint servers, brought on by the pandemic, are not of much interest to Spanish ECRs. They are focused on publishing as much as possible in high ranked journals, preferably open access, if they get money to pay for them. Junior researchers are also suspicious of preprints, fearing that publishing preprints means foregoing the possibility of publishing in a high impact journal.

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Outreach

Making lay members of society aware of their research has gained greater prominence among researchers as a result of the pandemic. ECRs, too, believe that it is crucial to get the support of the general public and they make an effort to achieve this, although it is the most experienced ECRs who practice outreach the most, because they are more experienced in research work. PhD students and recent PhDs are still very concerned about peer-to-peer publishing and feel that they need to spend all their time on it.

Pursuing an academic career

Despite the competitive and precarious environment in which they work, Spanish ECRs are positive about their future and rarely think of leaving. They are a resilient generation.

6.6.3. Possible permanent changes

1. Stronger preference for publishing open access will remain.
2. Greater efforts will be made to involve the general public in science.
3. The combination of virtual and face-to-face for meetings and conferences will reign on.

6.6.4. Characterisation of cohort

A resilient generation.

6.7. United Kingdom

6.7.1. Pandemic background

The UK was quite slow to ramp up restrictions initially, reaching a peak in Spring 2021 and dropping sharply towards the end of the study. The UK now is the second least stringent with most things outwardly back to normal, although there is an overhang impacting on ECRs.

> As to remote teaching –not all British ECRs had to teach, but those that did found that teaching virtually rather than in person was less satisfactory from a pedagogic point of view both for the teacher and for the student

6.7.2. Main impacts/changes

Working from home

The central impact of the pandemic on researchers and on their research was being forced to stay at home (especially during the first lock-down) and not being able to go into the lab or the field with, in all cases, a varying loss of results depending on the nature of their work –mice dying was perhaps the most upsetting. This had a particularly severe impact on candidates for doctorates: in almost all cases (10), except those near to finishing, the scope of the research had to be restricted and workarounds discovered.

As to remote teaching –not all ECRs had to teach, but those that did found that teaching virtually rather than in person, because of the pandemic, was less satisfactory from a pedagogic point of view both for the teacher and for the student. Still, when students used to virtual teaching were expected to go back into the classroom, they often did not turn up and concentrated badly.

Productivity/publishing

Research was definitely disrupted in the lockdowns stage of the pandemic. Several ECRs who expected their data to be analysed by another researcher, in accordance with the schedule which had been agreed, found they were not able to hand over their results for this analysis. However, they learnt software and did the work themselves when at home. Indeed, it was their impression that in spite of their short-term inconvenience, they had acquired skills which would be useful to them in the future. Others had a more negative outlook.

The impression is that the pandemic has, if anything, led to an increased emphasis on publishing OA. We did not see any resurgence of green except among the physicists even though some funders were happy with green. It has been suggested that there was a loss of interest in gold OA but this was not found to be the case. They all asserted the millennial beliefs of openness, sharing and transparency and this might explain their interest in publishing OA. However, answers relating to open data did not show any increase in sharing probably because the data produced by ECRs in medicine and social sciences (15 of the total) was usually not available in quantitative form.

Virtual meetings and conferences

It was generally agreed that it would be a pity if the recognised advantages of virtual conferences (cheaper, making the content available to ECRs as well as researchers from lower income countries) were to be lost, but the consensus seemed to be that so far there was no successful format for hybrid conferences. One ECR argued that studying the programme at a virtual conference and following up those speakers whose work interested was a better use of their time than the serendipitous approach that has been popular in the past**.**

For ECRs lab talks and local seminars have been an excellent way to showcase their early research and this continues to be true virtually and in person. In-person has not entirely taken over, and when they are preferred, it is because they are easier to operate. It is likely that virtual seminars will continue to be part of the way in which scientists cooperate, especially when a very important scholar is visiting.

Networking/collaboration

It was generally agreed that networking leading to collaboration was easier if conducted face to face rather than virtually. Those who, as of the third round of interviews, had been able to attend an in-person conference (sometimes for the first time) found that this was, indeed, the case. However, ECRs were very positive about the new virtual skills (*Teams* and *Zoom* for example) and realised that they could manage networking at a distance. Use of these skills marks a permanent change in preferred scholarly communications. The predecessors to *Zoom*, such as *Skype*, have almost disappeared from sight. There is no reason to suppose that these people will not use these new skills. Many doctoral candidates and post-docs have planned visits to labs and attend conferences, both of which, at the beginning of the pandemic could not be accomplished. The inability to do so was perceived as a serious setback, which, however, by now was seen as much less of a problem.

UK ECRs confirm one change due to the pandemic in their networking/visibility enhancing behaviour: the new predominating use of *Twitter*, which comes largely at the expense of *ResearchGate*. The post pandemic picture sees tweeting a link as active whereas adding a link to your profile on *ResearchGate* is an essentially passive move. It is too early to see the new status of *Twitter* as

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being a permanent change. *Twitter* also provides a forum for some ECRs, especially the senior ones among them, which seems to replace the forums provided by special *Facebook* groups.

Preprints

ECRs did see a relationship between the pandemic and the use of preprints both to achieve visibility and (maybe) feedback, and for looking to see what others were up to. The latter use preceded the former one, which took a while to become normal, but did do so during the course of the project. However, those who put earlier versions of an article on a preprint server did not come from all the disciplines and mostly came from the life and medical sciences (25% each of the cohort). The two physicists in the UK cohort used *arXiv* because this is what physicists do, but preprint servers have never been seen as an alternative to journal publication in physics disciplines. The attitude of the single chemist in the cohort over the period of the project had changed from doubts about putting a version of a paper into a preprint server to a decision to offer to a server with a next publication. For UK ECRs it is possible to see a majority of ECRs using preprint servers more than before COVID and there is no reason to suppose that this change in behaviour will not be continued. Others did not know of an appropriate preprint server in their discipline, including (rather surprisingly) most of the psychologists.

> In the UK, a few ECRs were worried about preprints, qualifying the general approval of preprint use by concern that journalists do not always differentiate between preprints and peer-reviewed articles, either due to ignorance or a wish to get ahead of the pack by highlighting an exciting finding

A few ECRs, however, were worried about preprints, qualifying the general approval of preprint use by concern that journalists do not always differentiate between preprints and peer-reviewed articles, either due to ignorance or a wish to get ahead of the pack by highlighting an exciting finding. For example, an ECR working on clinical trials was concerned that decisions about (clinical) trials would be made based on preprints which could lead to negative consequences. One medical scientist decided not to post her work as a preprint because she was worried that the more preliminary stage in her work would be seen as complete. Indeed, although ECRs were reluctant to blame the pandemic for lowering of standards, but pressure to get out papers in COVID related areas was condemned.

Outreach

It was generally agreed that the pandemic has resulted in an increased understanding of how science is done, because of the increased interest in COVID. Trust in science was important and there is no reason to suppose that this was a temporary phenomenon. The majority of ECRs are convinced of the importance of reaching out to the general public and exposing them to good science. Many took part in special workshops for the general public invited by their universities and also stakeholders such as fishermen and farmers but they did not buy into reaching out to policy makers (too junior?). Interaction with industry depending very much of the nature of their research. It is likely that this will continue in the future.

Re-evaluation of what is important in life

The experience of going through the pandemic has led many ECRs to an evaluation of their work/life balance, which might be one of the reasons for some of them taking the decision to leave the academy. The pandemic has highlighted and amplified the poor work/life balance for ECRs (and junior ECRs can see how senior ECRs also suffer). Also, the new emphasis on wider engagement brought on by the pandemic, particularly with the public, seems to have led to a wish among some to do a job which involves more impact and makes more of a difference.

Thus, one ECR's reflection is worth noting, as many other ECRs might well have been in agreement with it:

> "I think the pandemic has had a profound impact on our relationship to work. Firstly, there is obviously the disruption itself but I think this has had a cascade effect even when work was allowed to continue. Personally, it has led me to feel like I have had to 'catch up' all the time, leading to even more stress and pressure on myself because you constantly feel like you're not doing enough or falling behind. I have spoken to many who have felt the same, and are trying to develop a healthier relationship to work as a result. I think generally, it has been an inflection point which will have caused many people to stop the 'autopilot' and really question how they do what they do. It's also been an opportunity to see how open-access, sharing information, and funding science can have a positive impact on research and society. I hope that the lessons learnt from the pandemic will make academia a more open, healthy, collaborative and sustainable environment to work in".

Pursuing an academic career

More UK ECRs have decided against staying in the academy than in any other country, planning either on leaving immediately or as soon as a grant runs out/ a job outside comes up. None of the ECRs (about a sixth of them) planning to leave the academy have changed their mind and if anything, their intention has been strengthened. However, ECRs in UK resolutely refused to agree that the pandemic has been the reason for the wish to leave, al-

> The experience of going through the pandemic has led many British ECRs to an evaluation of their work/life balance, which might be one of the reasons for some of them taking the decision to leave the academy

though the aforementioned re-evaluation of the work/life balance in the wake of the experiences during the pandemic are plainly as the main reason for departure. A secondary or alternative reason is the wish to do something more useful/practical again contrasted with what happens in the university**.** It is not surprising that in many if not most UK universities there has been a new concern about the needs of ECRs not being met, inclusive of a concern that mentoring should be taken more seriously, and it is probable that this could be marked as a permanent impact of the pandemic.

> "I think generally, it has been an inflection point which will have caused many people to stop the 'autopilot' and really question how they do what they do" (British ECR)

Generally, we have noted how UK and US had so much in common regarding scholarly communications but when it comes to the pandemic, we have a very different story. While US ECRs have been discouraged by the pandemic experience but are resilient in deciding to continue their careers in academic research, UK researchers are not so resilient and minded to leave academe. This is because of two factors: 1) the pandemic has highlighted and amplified the poor work/life balance for ECRs (and junior ECRs can see how senior ECRs also suffer); 2) the new emphasis on wider engagement brought on by the pandemic, particularly with the public, seems to have led to a wish among some to do a job which involves more impact and makes more of a difference.

Country-specific impacts

Quite a number of ECRs suggested that COVID had a less serious impact on their work than Brexit, because of the possible loss of funding if the UK is removed from the *Horizon Europe* programme. Overall, ECRs were mostly resistant to ascribing the pandemic as a cause for anything, apparently believing that apart from working from home and the push to the virtual world it had little impact.

6.7.3. Possible permanent changes

1. A majority of ECRs will use preprint servers more than before COVID.

2. The importance of reaching out to the general public is recognised and it is likely that this will continue in the future.

3. ECRs were very positive about the new virtual skills (*Teams* and *Zoom*, for example) and realised that they could manage networking at a distance. Use of these skills marks a permanent change in preferred scholarly communications

> Quite a number of ECRs suggested that COVID had a less serious impact on their work than Brexit, because of the possible loss of funding if the UK is removed from the *Horizon Europe* programme

4. Virtual seminars will continue to be part of the way in which scientists cooperate.

5. In many if not most UK universities there has been a new concern about the needs of ECRs not being met and this could be marked as a permanent impact of the pandemic.

6. Mentoring will be taken more seriously.

6.7.4. Characterisation of cohort

A disappointed generation, with the pandemic sowing the seeds of disappointment.

6.8. United States

6.8.1. Pandemic background

The US was middling in terms of stringency but quite late in reducing restrictions.

6.8.2. Main impacts/changes

Working from home

Many ECRs missed being on-site or attending in-person meetings, and many had to work remotely at some point during the pandemic. The benefits of remote work mentioned were the ability to focus without interruptions, flexibility with work schedules, and more time available due to less commuting to/from work. It also led to ECRs creating new ways of obtaining data from human subjects that would not have happened if not for the pandemic. Several ECRs, who had teaching responsibilities, had to shift to remote teaching, with both asynchronous and synchronous methods mentioned.

Women with children at home tended to express more strongly issues with anxiety and, at times, inability to work, at least during the first part of the pandemic (of the three males interviewed, who had responsibilities as a caregiver, there was not much mentioned about childcare). However, remote work gave some of these ECRs the ability to be flexible with their time (e.g., working after putting children in bed at night).

Productivity

There was certainly a hit to research productivity in the early months of the pandemic, with ECRs who worked primarily in labs or with human subjects or with ECRs dealing with childcare and/or health issues (both physical and mental). However, several ECRs were able to maintain a similar level in their research productivity during the pandemic and a few even experienced an increase in productivity. Shifting to alternative data collection methods, conducting different analyses of existing data, and writing more papers were mentioned. A few ECRs, already engaged in long distance collaborative research projects, switched to remote work. A few ECRs mentioned dropping any activity that was not a priority (e.g., service, peer reviewing), and a few also mentioned that less commuting provided more time for work.

Most of those who did attend at least one virtual conference said they stopped doing so. (...) they had other distractions during the conference, whereas when they attended in-person conferences, there was more focus on the speakers and networking

Virtual meetings and conferences

A few ECRs also suggested travel for meetings would likely be less after the pandemic because now everyone is comfortable with *Zoom*. However, most ECRs disliked the pandemic-induced move to virtual conferences. Most of those who did attend at least one virtual conference said they stopped doing so. The main reason was they could not manage their time, i.e., they tended to do other work or had other distractions during the conference, whereas when they attended in-person conferences, there was more focus on the speakers and networking. A few ECRs acknowledged that there was less cost with virtual conferences, and more potential and diverse attendees, but said that in the future they would participate in virtual conferences if they were interested only in a few sessions or if there were issues with travel. Hybrid conferences might be therefore the option of choice.

Networking/Collaboration

Many ECRs said that collaborations were hindered in some way –either by not forming or by not maintaining ties (or both) with collaborators. The reasons most given was the inability to attend in-person meetings or conferences, or participating in other in-person activities, such as meeting over coffee or during dinner. Some of those ECRs who mentioned the inability to form collaborations were concerned that there would be a gap in their future research productivity. For example, several ECRs, who had grants going into the pandemic or were awarded grants during the pandemic, noted that obtaining their grants had been helped by in-person interactions with people well-before the pandemic. A few ECRs mentioned, however, that setting up collaborations and maintaining ties were easier with *Zoom* (e.g., versus emails and phone calls).

Peer review and posting preprints

Almost all ECRs complained about peer reviews being very slow during the pandemic and a few mentioned that editors were having trouble finding reviewers. Some also questioned the quality of the COVID-related peer reviews due to the sheer number of those papers that were published during the pandemic. In result, there will be more acceptance and use of pre-prints, which may accelerate research but endanger its quality.

Outreach

Some ECRs suggested that providing COVID-related papers quickly eventually led to confusion in the general public, especially if these had not been peer reviewed.

Re-evaluation of what is important in life

A few ECRs came out of the pandemic with the desire to make changes in their work lives, spending less time on work. These tended to be older ECRs or those closer to the Associate Professor stage of their careers.

Pursuing an academic career

The vast majority of ECRs just kept chugging along, working, overcoming obstacles, and/or innovating, i.e., doing whatever they needed to do to continue down their career paths. This should not be a surprise: reaching the doctoral level in academia typically requires a certain amount of both resilience and perseverance traits, so ECRs must have started off the pandemic as a breed of humans who have already proven they can do what is necessary to keep moving forward with their goals, and demonstrated these traits throughout the pandemic.

6.8.3. Possible permanent changes

1. Research institutions more accepting of work from home.

2. Continued use of virtual human subject data collection methods.

3. Decrease in travel due to more comfort with *Zoom*.

4. More remote classes offered by education institutions.

5. More acceptance of remote work for parents with children.

6. ECRs who were not using *Zoom* prior to the pandemic would likely continue to use *Zoom* to some extent when connecting with colleagues and potential and existing collaborators.

7. Move to hybrid conferences.

8. Due to slow peer review during the pandemic, more acceptance and use of pre-prints, which may hurt science as much as it helps science.

9. Less time spent on work.

6.8.4. Characterisation of cohort

A resilient and perseverant generation.

7. Conclusions

Without doubt, the biggest finding to emerge from the project has to be that ECRs proved the doomsters wrong, not only did they survive, but some prospered and their future prospects (in an increasingly virtual world) look good, if turbulent for Chinese, French and Russian ECRs. Thus, the project started out with 177 ECRs and finished with 165 after two long COVID years of being interviewed. Just above a 6% attrition rate –most leaving research or unable to spare the time then, despite the fact that the world and academe faced one of the greatest challenges it has ever had and still faces it to some extent, especially in China. Hardly anyone 'lost' their precarious job. This is why we prefer to refer to our ECRs, not as the lost or broken generation, but as the resilient generation.

Hardly anyone 'lost' their precarious job. This is why we prefer to refer to our ECRs, not as the lost or broken generation, but as the resilient generation

With the exception of the UK cohort who we can more aptly describe as the resilient and disappointed generation because the pandemic had provided the time and opportunity to reflect and re-think their career paths, which meant some did, or were planning, to jump ship.

There is much in common in regard to the pandemic impacts felt internationally and there is a general consensus as to what the permanent changes are going to be, so policy makers would be advised to wake up to what ECRs told us. After all, these researchers represent the biggest group of researchers, are on the research frontline and really constitute the research work horses undertaking all the scholarly communication activities as they do.

Behind most of the changes that have occurred lies the transition to working from home (WFH) or at a distance and the consequent move to the virtual world this brings with it for all kinds of activities once conducted physically –teaching, collaborating, networking, meeting etc. Thus, many of the scholarly activities once conducted largely physically are now undertaken remotely and virtually and appear firmly embedded in the scholarly enterprise. It is felt that this transition will prove to be cost effective and productive, more convenient and generally welcomed, but not by all. It follows then, that there will be greater acceptance of working from home as a consequence and this will be of particular benefit to parents who have children and researchers that like having a thinking space. WFH, however, can have unintended and unwelcome outcomes as the French experience shows, with a class divide opening up –seniors, in charge of their own destiny, work distantly and junior researchers coming into work to manage the laboratories and do the lectures.

Another, perhaps less hyped manifestation of working in a digital environment is the greater need to establish a virtual identity and presence, and we can clearly see how *Twitter* and *LinkedIn* in particular have benefitted here. Even *TikTok* is being touted by Chinese and Malaysian ECRs in this regard, often to the cost of *ResearchGate* and *Academia.edu*, who have the appearance of waning giants.

As to conferences, everyone believes that hybrid conferences will become the norm, although it is recognised, they are not perfect, but costs, convenience and accessibility wins out for ECRs especially as they are back of the queue when travel and accommodation expenses were handed out. The playing field has been levelled for them.

There is a belief, but not as universally exhibited: 1) that preprint servers will be here to stay, especially as a consequence of slow peer review, but the downside is it may hurt science as much as it helps science; 2) of the increased importance of reaching out to the general public and it is likely that this will continue into the future.

China, though, is the odd one out and has become isolated because of containment policies and international politics, which it will take many years to emerge from, with ECRs more stressed than before because of their vulnerability in a highly pressurised and isolated environment, which favours those in a tenured post and those already in collaborations. The gap/misunderstanding/difference between China and the West is expected to widen, so, interrupting the international flows of scholarly communication and collaboration. The Ukraine conflict is doing something similar to Russia researchers.

The new normal then is an increasingly virtual one, with all its attendant perfections and imperfections. Given the fact that ECRs are somewhat better at operating in the virtual world than their seniors (we were frequently told this was so) we can end on a good news note in respect to the future of the early career researcher. However, a small word of warning, there could be a black cloud over the horizon, with existing generational differences and tensions having been further exposed and exacerbated by the pandemic, especially so in the cases of China and France.

The biggest finding to emerge from the project has to be that ECRs proved the doomsters wrong, not only did they survive, but some prospered and their future prospects (in an increasingly virtual world) look good, if turbulent for Chinese, French and Russian ECRs

8. Notes

1. *Harbingers-2 – Early Career Researchers and the Pandemic*:
http://ciber-research.com/harbingers-2

funded by the *Alfred P. Sloan Foundation*:
https://sloan.org

2. Our definition of the term focusses on the common denominators of their standing in the scholarly world, i.e., their being employed in a research position but, being young and in an early phase of their career, not yet established as researchers: Researchers who are generally not older than 45, who either have received their doctorate and are currently in a research position or have been in research positions, but are currently doing a doctorate. In neither case are they researchers in established or tenured positions. In the case of academics, some are non-tenure line faculty research employees.

3. *http://ciber-research.com/harbingers.html*

4. For the full interview schedule see:
http://ciber-research.com/harbingers-2/20201202-H2-Interview_schedule-1.pdf

5. *https://ourworldindata.org/grapher/covid-containment-and-health-index?tab=chart&country=CHN~USA~GBR~ESP~FRA~RUS~MYS~POL*

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