How to teach the elderly to detect disinformation: a training experiment with *WhatsApp*

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Abstract

According to recent studies, most of the Spanish population identifies disinformation as a social problem and believes that it could endanger democracy and the stability of the country. In this context, many institutions point out the need for media literacy campaigns and initiatives that alleviate the possible harmful social effects of the phenomenon, especially among vulnerable audiences. While children and young people are the continuous target of this type of action, few so far have targeted the elderly. This article analyzes the effectiveness of a training action to increase the ability to detect false news in this age group. A 10-day course was designed, and a sample of 1,029 individuals over 50 years of age residing in Spain who are smartphone users was selected. Participants were divided into an experimental group (n=498), who were invited to take the course, and a control group (n=531). An *ex ante* and *ex post* study was carried out to determine the effects of the course on their ability to detect false news. The results reveal that those who took the course were more successful in identifying the news as true or false than the members of the control group. The results confirm the opportunity and convenience of designing media literacy actions aimed at those over 50 years of age, a social group particularly exposed to disinformation.

Keywords

Disinformation; Media literacy; Vulnerable groups; Older people; Elderly; Aged persons; Smartphones; Training activities; Digital competence; Internet; False news detection; Fake news; Critical thinking; Social networks; *WhatsApp*; Experiments.

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1. Introduction

The information society allows citizens constant access to content from all kinds of sources, official and personal, professional and amateur, well-intentioned and ill-intentioned. The complexity of this ecosystem, where truthful information coexists with false or erroneous content, highlights the need to train users to be critical of the information they receive and share. The term *disinformation* refers to

> "false or misleading content that is spread with an intention to deceive or secure economic or political gain, and which may cause public harm" (*European Commission*, 2019).

This is a phenomenon that has become commonplace in the consumption of content on social networks and often reaches public opinion. When information is abundant, errors can appear, which are commonly referred to as "misinformation" (**Burnam**, 1975), a phenomenon different from disinformation, which points to deliberate falsehoods. These lies, which spread rapidly in the highly polarized context in which we find ourselves (**Sádaba**; **Salaverría**, 2023), are potentially dangerous for citizens and also for social cohesion (**Brennen** *et al.*, 2020; **Salaverría** *et al.*, 2020). Although the phenomenon is not directly attributable to technology, the widespread access to the Internet and consumption of content on social networks, along with the social and political tensions of recent years, have been accompanied by an increase in false content, with diverse intentions (**Shu** *et al.*, 2020).

Spain does not escape from this global reality, and, according to the *I Study on disinformation in Spain* (*Uteca*; *Universidad de Navarra*, 2022), 95.8% of the population identifies it as a social problem. Ninety-one percent of those surveyed believe that disinformation can endanger democracy and the stability of a country, and 83.3% consider that the pandemic and the war in Ukraine have contributed to its growth. The *Uteca* study also corroborates two noteworthy elements: it identifies age as a relevant variable (**Santibáñez-Velilla**; **Latorre-Santibáñez**; **Tejada-Sánchez**, 2014), and it evidences that older people tend to continue to trust more in the traditional media they consume more frequently. Along with age, other studies point out that gender and educational level may be significant variables in the behavior towards this type of content (**Ramírez-García**; **González-Fernández**; **Sedeño-Valdellós**, 2017). It is also clear that the third-person bias is confirmed in this area (**Corbu**; **Oprea**; **Frunzaru**, 2021), since there is a tendency to think that others are more likely to be deceived than oneself (**Altay**; **Acerbi**, 2023; **Martínez-Costa** *et al.*, 2022). Added to this is the subjective factor that **Watson** (1960) calls "confirmation bias," which implies that people tend to favor information that confirms their own beliefs or prejudices. This bias has given rise to a debate on the extent to which social networks can generate a certain "echo chamber" effect (**Iandoli**; **Primario**; **Zollo**, 2021), which in any case adds more urgency to the fight against disinformation.

2. Media literacy: part of the solution

It is easy to understand that a problem of this complexity does not have a simple solution, but requires a coordinated effort of numerous agents and at all levels (**Cucarella**; **Fuster**, 2022). Experts have been warning for years about the dangers of disinformation and the need for the media and journalists to work to combat it and not promote it (**Galdón-López**, 1994; **García-Matilla**, 1999; **Pérez-Tornero**, 2008). The emergence of *fact-checkers* can be understood as a sectoral response to this problem (**Nieminen**; **Rapeli**, 2019). Although *fact-checking* serves to limit the public dissemination of false content (**Carnahan**; **Bergan**, 2022), its effect is insufficient, and, as certain studies point out, in certain contexts it is even innocuous (**Margolin**; **Hannak**; **Weber**, 2018; **Oeldorf-Hirsch** *et al.*, 2020). It has been found, for example, that the ability of *fact-checkers* to disprove political disinformation among the population through fact-checking is substantially attenuated by citizens' pre-existing beliefs, ideology, and knowledge (**Walter** *et al.*, 2020).

As a complement to strategies against disinformation based on information verification, the efforts of governments and institutions to address the negative consequences of the phenomenon are increasing (**Sádaba**; **Salaverría**, 2023; **Wardle**; **Derakhshan**, 2017). Within the framework of these initiatives, media literacy emerges as part of the solution, as it underscores the need to equip citizens with resources and personal skills that enable them to cope with their own biases in the first place, and with the disinformation strategies of which they may ultimately fall victim.

In the early 1990s, the concept of media literacy was defined as

> "the ability of a citizen to access, analyze and produce information for specific results" (**Aufderheide**, 1993, p. 6).

Years later, a simpler definition was agreed upon:

> "The active attitude and critical thinking about the messages we receive and create" (*Namlr*, 2007, p. 3).

In the European context, media literacy has been understood as the

> "the ability to access, analyse, evaluate and create messages across a variety of contexts" (**Livingstone**, 2004, p. 18).

The digital scenario has added new skills required to this media competence, understood in a more integrative way and that challenges not only the formal educational stage, but also lifelong learning (**Kačinová**; **Sádaba**, 2021). Therefore, as recognized by Ferrés and Piscitelli,

> "media competence has to face […] this complexity, combining the enhancement of participatory culture with the development of critical capacity" (**Ferrés**; **Piscitelli**, 2012, p. 77).

At stake are issues that raise the need for citizens to have knowledge and skills to verify the information they consume (**Redondo**, 2018).

2.1. The elderly: a vulnerable public in the face of disinformation

In recent years, numerous digital and media literacy efforts have been developed targeting the younger population, a segment of the population characterized by a lower critical capacity for information and intense exposure to digital content (*European Commission*, 2022; **Herrero-Diz**; **Conde-Jiménez**; **Reyes-de-Cózar**, 2021). Moreover, the fact that it is easy to reach youth through formal education channels has made this population group an essential audience in the design of any media literacy strategy. Along with the young, the elderly also emerge as a potentially vulnerable group. Although it is true that, given their maturity and experience, they are attributed with greater critical capacity, their knowledge and skills to select and weigh the information they receive through the Internet may be more limited (**Papí-Gálvez**; **La-Parra-Casado**, 2022). If, in addition, this information reaches them through "second generation" networks, such as *WhatsApp* or *Telegram*, and given that they tend to place their trust not in the medium, but in those who send them the information (**Valera-Ordaz** *et al.*, 2022), they can become not only consumers of disinformation, but also disseminators. In fact, the *Digital News Report 2021* highlighted the role of *WhatsApp* in Spain in the dissemination of false information (**Amoedo-Casais** *et al.*, 2021).

Therefore, the digital competence of older people, or in many cases its absence, becomes a key factor in the fight against the harmful effects of disinformation. In addition to constituting, from a demographic point of view, a considerable part of society, older people consume a lot of information and are interested and concerned about informational issues (**Brashier**; **Schacter**, 2020). Although academic interest in media literacy for this age group is growing, as **Ramírez-García**, **González-Fernández** and **Sedeño-Valdellós** (2017) point out, both research and the design of actions and strategies for this audience are still limited.

This article explores to what extent a training action can improve the ability to identify misinformation among the over 50s. The evidence obtained may not only open up new avenues of research but also provide ideas for the design of plans aimed at this essential public in democratic and social life. The aim is to answer two specific questions:

1. Can a course designed for this age group, over 50, increase their ability to detect fake news?

   1.1. Following **Ramírez-García**, **González-Fernández** and **Sedeño-Valdellós** (2017), is gender a relevant variable in the possible effectiveness of this course?

2. Can this training contribute to the degree of security with which this audience consumes online information?

3. Methodology

In order to answer the research questions, we proceeded to analyze the results and impact of the course "What to do to detect false information on the Internet," launched in Spain in April 2022 by the international media literacy project *MediaWise*, promoted by the *Poynter Institute* of the United States and the Spanish digital native medium *Newtral*, with the support of *Meta*. Aimed at people over 50 years of age, it was a free 10-day course, through *WhatsApp*, with lessons of at least 5 minutes a day. Users had to sign up by sending a message, and, from that moment on, they received a daily session that included a video with simple and practical techniques, designed to improve judgment in the use of Internet information resources and digital skills in general. The content of the videos went from general knowledge to targeting specific skills: the reality of disinformation, the main channels of dissemination of this type of content, what aspects to look for when doubting the veracity of a news item, and tips and ideas for learning how to check it for oneself (image search, use of *fact-checkers*, etc.). In addition to the video, each day they were asked a simple question about their content.

In order to test the effectiveness of this course in detecting disinformation, a two-wave, *ex ante* and *ex post* research was designed and applied to two groups: an experimental group, which received an invitation to take the course, and a control group. Two questionnaires were developed to assess the baseline situation and the possible evolution in terms of participants' ability to identify fake news and their skills to contrast information or their general knowledge of Internet-related terms. Both groups completed two questionnaires.

Participants were selected from among men and women residing in Spain who were over 50 years of age and users of a *smartphone*. It is true that this factor, required by the fact that the course took place via *WhatsApp*, implies some limitations on the study universe: compared to 96% of users in Spain who have a smartphone, only 51% of those over 55 have one (*IAB Spain*, 2019a). Among these mobile users, *WhatsApp* (90%) and *Facebook* (66%) are the two most used social networks (*IAB Spain*, 2019b). The number of participants in the study is detailed in Table 1.

Table 1. Number of participants in the study

	Control	Experimental	Total
Ex ante	531	498	1,029
Ex post	448	200	648

For the design of the questionnaires used, we adapted the one created by **Moore** and **Hancock** (2022), once permission had been obtained. The questionnaire adapted to Spain was structured in six blocks. Block 1 asked participants to evaluate the truthfulness or falsehood of some selected headlines, using a seven-item Likert scale (from "clearly false" to "clearly true"). They were presented with a total of six headlines, three with false or inaccurate information and three true news items. Among the false (or inaccurate), one was congruent with right-wing ideological bias, one was congruent with left-wing ideological bias, and the third was neutral (see Table 2). The 12 headlines included in the two waves were extracted from media and news websites; in the case of false or inaccurate headlines, they were chosen from those that had been reviewed by a *fact-checker*. In their selection, only news items from the last month before each wave were taken into account, in order to potentially seek greater recall among the sample subjects. Block 1 also asked whether the participants had searched for information about the news before giving their opinion on the veracity of each headline. Table 1 shows the headlines used in the questionnaires of both phases.

Table 2. News headlines used in the questionnaires (*ex ante* and *ex post*)

	True news	False news
Congruent with a left-wing bias	**News 4**	**News 1**
	A high-ranking Ayuso official spread via *WhatsApp* that his brother had received 283,000 euros from *Priviet Sportive* *The Community of Madrid would have confirmed, by mistake, that Tomás Díaz Ayuso received 283,000 in 2020 from Priviet Sportive.*	**Moreno Bonilla allocates more resources to private healthcare while he lays off 8,000 public healthcare workers** *Thirty-eight percent of the reinforcement healthcare workers who have been dismissed in our country have been dismissed in Andalusia.*
	News 10	**News 7**
	Ayuso's toll on *Vox*: no research on therapies to cure homosexuality *Since the arrival of the Councilor for Family, Youth and Social Policy, there has been no ex-officio action against possible cases of LGTBIphobia in the Community of Madrid.*	**The IMF is against the tax cuts proposed by the *PP*** *A frontal blow to Feijóo.*
Congruent with right-wing bias	**News 5**	**News 2**
	Iglesias and Monedero go on the attack against the EU for vetoing Putin's propaganda organs *Iglesias said that Russia Today and Sputnik report in favor of the Russian government just as Mediaset and Atresmedia report in favor of their owners.*	**Social Communists defend Putin** *The social-communist government is making an appalling fool of itself over Russia's invasion of Ukraine.*
	News 11	**News 8**
	Education eliminates Philosophy as an elective and introduces Civic and Ethical Values *The contents of Philosophy will be included in the compulsory fourth-grade subject known as Education in Civic and Ethical Values.*	**Socialist Soria City Council finances a workshop to draw vulvas on cloth bags** *Funded by part of the 20 billion euros that Sanchez gave to the Minister of Equality.*
Neutral content	**News 6**	**News 3**
	73-year-old woman arrested in Toledo for marijuana cultivation *Seized 552 plants in advanced flowering stage with a total weight of 92.2 kilograms.*	**Thousands of deer become infected with Covid and generate a new coronavirus** *Interactions between deer and humans, or other animals, are now a cause for concern.*
	News 12	**News 9**
	A man's true identity discovered thanks to Covid vaccine *In the US city of Newport.*	***BBC* reveals that the Kramatorsk massacre was the work of Ukraine, not Russia** *The missile's serial number belongs to the Ukrainian military.*

The questionnaire presented the headline decontextualized and asked the participant for his or her opinion about its veracity and then asked if he or she had used any means to contrast the information before giving his or her answer. There was no time limit for answering.

Block 2 of the questionnaire asked about the technological skills of the participants. Block 3 asked about the level of trust in the information received through all media. Block 4 inquired about the media and technology consumption habits, as well as the political preferences of the participants. Block 5 asked for demographic information. Finally, Block 6 explained the inaccuracies or falsehoods included in the headlines of Block 1.

The research was conducted between the end of April and the end of June 2022 and was carried out by *YouGov*. Specifically, the first wave was conducted between the end of April and mid-May 2022 and the second wave from the second week of June 2022 until the end of June 2022. The research design, fieldwork contracting, and data analysis were the sole responsibility of the research team. The project was approved by the *Research Ethics Committee* of the *University of Navarra*.

4. Preliminary results

4.1. Description of the sample

Of the 1,029 participants in the first phase of the study (*ex ante*), 47.9% were male and 52.1% were female; a single participant chose "other" in the definition of gender. The ages of the study participants can be seen in Table 3.

Table 3. Ages of participants in the total *ex ante* sample (n=1,029)

Age	Participants	%
50-59 years	335	32.6
60-69 years	448	43.5
>70 years	246	23.9

Of the 498 participants in the experimental group, 190 attended at least one of the 10 sessions of the course. For the purposes of data analysis, a subsample of 87 of these 190 cases was taken into consideration, made up of those who had attended five or more sessions. This decision, while undoubtedly limiting the predictive potential of the data, is consistent with the objective of observing results clearly linked to the course.

Table 4. Ages of participants in the experimental subsample ($n_{\geq 5}$=87)

Age	Participants	%
50–59 years	33	37.9
60–69 years	41	47.1
>70 years	13	14.9

Among the 87 participants in the experimental group subsample, there are slightly more men (51.7%) than women (48.3%). Likewise, the difference between the percentage of men and women is somewhat more pronounced than that of the total sample. In the subsample of the experimental group, there is also a slightly higher percentage of people between 60 and 69 years of age in relation to the total sample.

Among the participants, the most frequent level of education was school graduation or vocational training. A total of 28% of the total sample and 36.7% of the experimental group had undergraduate or postgraduate university studies (see Table 5). The distribution of the total sample and the experimental group by Autonomous Community of residence can be seen in Table 6.

Table 5. Educational level of participants

Education level	Total sample		Experimental group	
	n	%	$n_{\geq 5}$	%
No education	23	2.2	1	1.1
School graduate	400	38.9	25	28.7
Professional training	318	30.9	29	33.3
University degree, 2 years	87	8.5	11	12.6
University degree, 4 years	143	13.9	12	13.8
Postgraduate	58	5.6	9	10.3
TOTAL	1,029	100	87	100

The political positions of the participants were distributed as follows: in the total sample, 42% declared that they belonged to left-wing ideological groups, 27.7% to the right, 18.8% said they belonged to the center, and 11.6% chose the "other" category. The distribution in the experimental group was similar, with 41.4% on the left, 26.4% on the right, 13.8% in the center, and 18.4% in the "other" category.

In terms of Internet use, 83% of both research groups reported going online several times a day, with no gender differences in this regard. The rest did so around once a day or several times a week. Table 7 shows the time spent using social networks. There are no major differences between the two groups, nor between men and women: more than half of the participants said they used the networks less than 30 minutes a day, and 20% used them more than an hour a day.

Table 6. Place of residence of participants

Region	Total sample		Experimental group	
	n (1,029)	%	n≥5 (87)	%
Andalusia	180	17.5	15	17.2
Aragon	26	2.5	2	2.3
Principality of Asturias	39	3.8	5	5.7
Balearic Islands	23	2.2		
Canary Islands	31	3.0	3	3.4
Cantabria	15	1.5		
Castilla-La Mancha	35	3.4	2	2.3
Castilla y León	45	4.4	3	3.4
Catalonia	212	20.6	16	18.4
Valencian Community	113	11.0	10	11.5
Extremadura	26	2.5		
Galicia	36	3.5	5	5.7
La Rioja	4	0.4		
Community of Madrid	168	16.3	22	25.3
Region of Murcia	22	2.1	2	2.3
Community of Navarra	15	1.5	1	1.1
Basque Country	37	3.6	1	1.1
Ceuta/Melilla	2	0.2		

Table 7. Daily access to social networks during the last week (%)

Use times	Total sample		Experimental group	
	Man	Woman	Man	Woman
Less than 10 minutes	13.5	12.0	13.8	11.5
Between 10 and 30 minutes	15.9	14.4	16.1	14.9
Between 31 and 60 minutes	14.4	9.3	10.3	16.1
Between 1 and 2 hours	5.5	7.4	6.9	2.3
Between 2 and 3 hours	2.2	3.6	3.4	1.1
More than 3 hours	1.5	3.3	1.1	2.3

4.2. Course effectiveness

4.2.1. Ability to identify the veracity or falsity of news stories

Table 8 shows the percentages of success in identifying the veracity or falsehood of the news presented in waves 1 and 2 by both the experimental group ($n_{\geq 5}$=87) and the control group.

Table 8. Level of accuracy in detecting false and true news

	Wave	Holder	Political bias	(a) % Experimental subsample ($n_{\geq 5}$=87)	(b) Control group (n=448)	(a)-(b)
News 1	1	False	Left	41.3	34.2	7.1
News 2	1	False	Right	53.1	47.8	5.3
News 3	1	False	Neutral	87.5	83.8	3.6
News 4	1	True	Left	36.7	30.9	5.8
News 5	1	True	Right	49.8	45.0	4.8
News 6	1	True	Neutral	57.7	50.0	7.7
News 7	2	False	Left	33.0	37.1	-4.1
News 8	2	False	Right	59.1	60.0	-1.8
News 9	2	False	Neutral	66.6	60.2	6.3
News 10	2	True	Left	73.6	57.6	16.0
News 11	2	True	Right	40.5	26.0	14.4
News 12	2	True	Neutral	27.9	27.0	7.0

It can be seen that having attended at least five of the course sessions has a positive impact on the participants' ability to identify whether the headlines are true. The starting point of the experimental subsample is already more positive than that of the control group before the course, perhaps due to a greater prior interest in accessing reliable information, which led the participants to follow the course sessions and participate in the survey. Apart from this circumstance, what is certain is that the participants of the experimental subsample, after at least five sessions of the course, showed an improvement in the level of accuracy in identifying false or true news.

However, there are differences in the ability to recognize true and false news, respectively. The study shows that, once they have received the training, the degree of accuracy of the members of the experimental subsample improves when it comes to identifying as true the information that is indeed true. In contrast, their ability to identify false information as erroneous is only slightly improved or even slightly diminished. This difference in the ability to identify one or the other is probably related to the fact that older adults find it easier to confirm the veracity of true news from reliable sources, a habit cultivated throughout the course. In contrast, the skills needed to identify false information as erroneous require greater effort and expertise, which have not been sufficiently developed by the members of the subsample. In this sense, the knowledge and use of information verification organizations, which are much lower in this age group than the use of traditional information sources, limit their ability to identify false information.

Table 9 shows the values of subjective certainty perceived by the participants about the validity of their own judgment. In other words, it indicates how confident the participants are that they are correct about the veracity or falsity of the news. Those who have taken the course show a higher perception of confidence in assessing the falsity of the news than those in the total sample. The members of the experimental subsample reveal, in fact, greater subjective certainty of having been able to detect false information, even if they were actually confused. This overconfidence effect could be due to the fact that, in the absence of contrasted information, they consider that their training enables them to better detect falsehoods. On the other hand, they have more doubts about their own judgment in the news that they get right compared to the control group, the true ones. This phenomenon could be a double-edged sword, as it could cause the user to relax due to overconfidence in his or her ability.

Table 9. Degree of certainty in the detection of false and real news

	Wave	Holder	Political bias	(a) % Experimental subsample ($n_{\geq 5}$=87)	(b) Control group (n=448)	(a)-(b)
News 1	1	False	Left	23.1	21.6	1.6
News 2	1	False	Right	29.7	33.8	-4.1
News 3	1	False	Neutral	35.3	37.9	-2.7
News 4	1	True	Left	22.8	23.6	-0.8
News 5	1	True	Right	24.3	20.5	3.9
News 6	1	True	Neutral	17.1	16.4	0.7
News 7	2	False	Left	25.3	15.0	10.3
News 8	2	False	Right	35.7	17.8	17.9
News 9	2	False	Neutral	31.8	17.9	13.9
News 10	2	True	Left	28.7	21.8	6.9
News 11	2	True	Right	25.0	16.9	8.1
News 12	2	True	Neutral	27.3	10.3	17.0

4.2.2. Accuracy about the veracity or falsity of the news

Incidence of the gender variable

From the descriptive point of view, the judgment of the participants regarding the veracity or falsity of the news is analyzed, interpreting that the news are deemed false when they are scored between 1 and 3, and true when they are scored between 5 and 7, within a range from "1 = clearly false" to "7 = clearly true." In the case of certainty about the correctness of the assessment of the truthfulness or falsity of the news item, the analysis focuses on the mean number of responses to the question "How certain are you of your opinion?", taking as data the response to the option "5 = totally certain," within a scale whose range is "1 = not at all certain, 5 = totally certain." In this section, the results of this analysis are considered according to the gender of the participants. The descriptive analysis is complemented with the application of Student's t-test for independent samples, taking gender (male or female) as the independent variable and the dependent variables of the evaluation of the truthfulness or falsehood of each news item, and the certainty of correctness of the previous evaluation.

As can be seen in Table 10, for both waves and groups, the statistical analysis of the comparison of means indicates a low incidence of the gender variable in the correctness of the participants regarding the veracity or falsity of the news.

In this sense, the only cases that indicate the presence of this influence belong to the experimental group, one in the first wave of the study and two in the second. It is noteworthy that in these three cases, women outperformed men in terms of success.

From a descriptive point of view and according to the political orientation of the headline, women in the experimental group have a higher hit rate in all those headlines with a "right-wing" political bias, and men outperform women in three of the four headlines with a "left-wing" orientation. It is noteworthy that the headlines with a neutral political orientation in the first wave obtain the highest hit rates, for both men and women, compared to those news items with some type of political bias.

In the control group, there is little difference in the hit rate between men and women. The absolute mean difference between the two is 3.6 points. Men are slightly more successful than women in all the news items presented during the first wave, and women are more successful than men in three of the six news items of the second wave, with a tie between both genders in two other news items of this wave.

The differences within the experimental group, from the descriptive point of view, are somewhat more pronounced and varied. The absolute mean of the differences in the hit rate by gender reaches 11.9 points. In general terms, women score more correctly in both waves. In two of the three cases where there is a notable difference between men and women, the statistical analysis of the comparison of means indicates that this may be influenced by the gender variable. Finally, there is no clear pattern of accuracy by gender depending on whether the news is true or false, from both a descriptive and a statistical point of view.

Table 10. Accuracy about the veracity or falsehood of the news, according to the gender variable

				Experimental group				Total sample			
	Wave	**Holder**	**Political bias**	**Total**	**Man**	**Woman**	***p***	**Total**	**Man**	**Woman**	***p***
News 1	1	False	Left	41,3	42.2	40.5	0.353	34.2	36.9	31.6	0.594
News 2	1	False	Right	53.1	46.7	59.5	0.613	47.8	50.8	44.8	0.633
News 3	1	False	Neutral	87.5	84.4	90.5	0.645	83.8	85.6	82.1	0.271
News 4	1	True	Left	36.7	37.8	35.7	0.318	30.9	33.1	28.8	0.645
News 5	1	True	Right	49.8	40.0	59.5	0.016	45.0	46.2	43.9	0.409
News 6	1	True	Neutral	57.7	51.1	64.3	0.474	50.0	50.4	49.5	0.902
News 7	2	False	Left	33.0	42.2	23.8	0.362	37.1	36.0	38.2	0.295
News 8	2	False	Right	59.1	44.4	73.8	0.014	60.9	57.6	64.2	0.279
News 9	2	False	Neutral	66.6	68.9	64.3	0.611	60.2	60.6	59.9	0.417
News 10	2	True	Left	73.6	73.3	73.8	0.953	57.6	53.8	61.3	0.867
News 11	2	True	Right	40.5	33.3	47.6	0.116	26.0	27.5	24.5	0.313
News 12	2	True	Neutral	27.9	17.8	38.1	0.016	20.9	21.6	20.3	0.397

Safety on the hit valuation

Table 11 reflects the results of those participants who affirm total certainty about the accuracy of their assessment of the truthfulness or falsity of the news presented in the research. In this aspect, the statistical analysis of mean comparison indicates an almost null incidence of the gender variable during the first wave. However, during the second wave, this incidence is present in half of the news items evaluated in the control group and is almost non-existent in the case of the experimental group. This may indicate two realities: by repeating the same pattern of analysis and evaluation of news items in the same group, the statistical incidence of the gender variable increases. On the other hand, the fact of having participated in the training course significantly attenuates the influence of gender on the assessment of the correctness of the true or false nature of the news.

By groups, from the descriptive data, the control group offers fewer differences in the perception of security, the absolute mean difference between both genders being 5.1 points. In all the news items evaluated, men slightly outperformed women in the "totally safe" option. The experimental group offers more variety in this respect: the differences in absolute certainty on the correctness vary more; in absolute terms, it is 11.9 points between the two groups. During the first wave, greater confidence is equally distributed between the two genders, and men are more confident of being correct in the second wave.

Table 11. "I am totally sure" about the veracity or falsehood of the news, according to the gender variable

				Experimental group				Total sample			
	Wave	**Holder**	**Political bias**	**Total**	**Man**	**Woman**	***p***	**Total**	**Man**	**Woman**	***p***
News 1	1	False	Left	23,1	20.0	26.2	0.249	21.6	23.3	19.8	0.771
News 2	1	False	Right	29.7	35.6	23.8	0.310	33.8	36.4	31.1	0.056
News 3	1	False	Neutral	35.3	46.7	23.8	0.747	37.9	39.0	36.8	0.831
News 4	1	True	Left	22.8	28.9	16.7	0.018	23.6	24.6	22.6	0.262
News 5	1	True	Right	24.3	20.0	28.6	0.726	20.5	22.5	18.4	0.537
News 6	1	True	Neutral	17.1	22.2	11.9	0.237	16.4	18.6	14.2	0.239
News 7	2	False	Left	25.3	26.7	23.8	0.685	15.0	18.2	11.8	0.011
News 8	2	False	Right	35.7	33.3	38.1	0.312	17.8	19.9	15.6	0.107
News 9	2	False	Neutral	31.8	42.2	21.4	0.247	17.9	22.0	13.7	0.011
News 10	2	True	Left	28.7	31.1	26.2	0.699	21.8	23.3	20.3	0.935
News 11	2	True	Right	25.0	33.3	16.7	0.994	16.9	22.0	11.8	0.003
News 12	2	True	Neutral	27.3	37.8	16.7	0.410	10.3	14.0	6.6	<.001

5. Discussion and conclusions

As a starting point, it is apparent that the ability to discern whether a news item is true or false in the digital environment cannot be presupposed in the case of this age group, which is therefore particularly vulnerable (**Papí-Gálvez**; **La-Parra-Casado**, 2022; **Santibáñez-Velilla**; **Latorre-Santibáñez**; **Tejada-Sánchez**, 2014). That said, and responding to the first research question of this article, it is possible to affirm that the realization of the course has proved effective in increasing the ability of participants to identify the truthfulness/falseness of the information presented to them. In relation to the incidence of the gender variable, and in line with what was pointed out by **Ramírez-García**, **González-Fernández** and **Sedeño-Valdellós** (2017), sex did mark some differences in this ability in the *ex ante* analysis, but the course has mitigated such differences in a way to the point of making them disappear in the sample in the *ex post* analysis.

Regarding the second question, where we asked whether greater knowledge may imply greater security, the results show that the perception of being better prepared to deal with disinformation may have a rebound effect that is particularly evident in the face of false information. Detecting falsehood in the news requires advanced technical skills, which are generally lacking in those over 50. On the contrary, confirming that information is true is easier for them, thanks to the traditional media that they regularly consume. (**Brashier**; **Schacter**, 2020). On the other hand, the increase in training to verify the veracity or falsity of a news item significantly reduces the effect that gender can have on the perception of being right in the judgment.

It is therefore possible to conclude that training actions on media literacy can have a positive effect on the population over 50. The previous interest that these people have in information makes them victims of hoaxes more frequently and, also, unwitting collaborators of their dissemination, as they do not have specific knowledge to verify what they hear or see. It cannot be forgotten that it is advisable to work with an increased concept of media competence (**Kačinová**; **Sádaba**, 2021), which also includes digital reality and its specific competences, as well as other possible areas.

This research seeks to provide ideas to better understand how older people face the challenge of disinformation and to offer useful clues for the design of effective media literacy strategies for this sector of the population. It becomes clear that it is necessary to seek and design strategies and activities that are adapted to their reality and that are easily accessible. Public administrations and third-sector organizations must be alert and aware of the vulnerability of this public and make firmer and more creative decisions to reach them.

6. Limitations of the study and next steps

Although it provides encouraging and positive data on the effectiveness of a training action to improve the defense capacity of the over-50 age group in the face of disinformation, the study has some limitations. It would be worth analyzing in depth the incidence of some sociological traits on the ability to distinguish between true and false news, as well as on the effectiveness of a training action. It could be explored, for example, whether factors such as political ideology, level of education, or frequency of Internet connection affect the ability to identify false content. The incidence of age, especially after 65 years of age, is also an element that could receive special attention. Another limitation, which points to the need to find creative and truly accessible ways to reach this age group, has to do with the platform (*WhatsApp*) selected for this course: while the content has proven capable of facilitating positive results in those who have completed a significant number of its sessions, it has been difficult to get a large sample of users who have completed it in its entirety.

It is possible that other formats and platforms, more accessible and understandable for this age group, may need to be considered in order to disseminate this valuable content. In this sense, it is true that the action itself had the limitations of the platform used, which made it difficult to offer support or reference material that could complement the videos.

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