

Research Groups in Spain Studying the Public Communication of Science

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Abstract

This study investigates the state of the art of the Spanish research on the public communication of science, with the aim of identifying the current research groups in this field and characterise them. To do this, a twofold methodology was implemented: a content analysis of the information contained in the websites of the 91 universities in Spain, and 21 semi-structured interviews with science communication researchers. The results show that the public communication of science is a developing field of research in Spain. At least 47 groups study this issue, either as its only research focus (n=7) or together with other fields (n=40). These groups are distributed across 15 from the 17 Spanish regions (also called "autonomous communities"). They belong to a variety of university departments and disciplines: Communication/Journalism (50.0%), Philosophy (15.9%), Medicine and life sciences (9.1%), Humanities and social sciences (6.8%), Education (4.5%), History of science (4.5%), Sociology (4.5%) and Philology (2.3%). The research groups depend mostly on national grants for funding. They also report unevenly distributed collaboration networks. The main research lines and shortcomings in this sector are also identified.

Keywords

Public Communication of Science, Public Understanding of Science, Social Perception of Science, Research Groups, Research Funding, Spain.

1. Introduction

The research field that studies public communication of science (also known by its researchers as science communication) is relatively new but already constitutes a recognisable discipline (Trench; Bucchi, 2010) that is expanding (Guenther; Joubert, 2017; Peters, 2022). According to Fischhoff (2013), research in public communication of science draws on many different disciplines, including journalism, education, sociology, social psychology, linguistics, philosophy of science or political science. Other authors agree that public communication of science itself is very heterogeneous since it brings together various disciplines (González-Alcaide *et al.*, 2009; Trench; Bucchi, 2010).

It is necessary to understand the current state of Spanish science communication research in much more detail to be able to analyse its evolution and, if necessary, design and implement actions for its promotion



As a term, ‘science communication’ can be used to refer to both the field of scholarly communication, that is, professional communication among scientists (Codina, 2023; Rodríguez-Bravo; Nicholas, 2019; Torres-Salinas, 2020), as well as the field centered in communicating science to society, also known as the public communication of science (Barceló-Hidalgo; Dávila-Lorenzo, 2023; Gascoigne et al., 2020; Parejo-Cuéllar et al., 2024; Schiele et al., 2021; Stocklmayer et al., 2001). Here we would like to clarify that the object of study of this paper is the public communication of science. Therefore, throughout the article, we will use the concepts of ‘science communication’ and ‘public communication of science’ as synonyms. In other words, when using the term ‘science communication’ in this paper we are not including scholarly communication but rather science communication addressed to the general public.

The diversity of science communication as an object of study and training lies in both its vitality and its vulnerability (Trench, 2012), since such variety provides great richness, but also a certain degree of theoretical fragmentation (Metcalf, 2019). There are already several works on the development of science communication as a discipline, such as the *Routledge Handbook of Public Communication of Science and Technology* (Bucchi; Trench, 2008), the collection of articles in the *Science of Science Communication* (Fischhoff, 2013) and the most recent collective work, *Communicating Science: A Global Perspective* (Gascoigne et al., 2020), amongst others. Scientific knowledge should inform the design of new policies, but this knowledge does not properly reach policy-makers and not enough policy-making events are organised (Entradas et al., 2020; Pulido-Salgado; Castaneda Mena, 2021). Trench and Bucchi (2021) argue that science communication research should contribute to a more informed and open debate on science in society, at all levels and addressing all relevant actors.

1.1. International Context

The academic literature aids in the understanding of the current state of the research on public communication of science at an international level. Such research is characterised by several factors, one of them being that some specific topics (such as the public perception of science and media studies) receive a lot of research attention (Gerber et al., 2020), while other topics (such as the relations between science and society, or trust in science) are rarely studied (Bucchi, 2016; Bucchi; Trench, 2016; Gerber et al., 2020; Peters, 2022). Various authors agree that further research is needed on specific topics, such as the impact of science communication (Bucchi, 2016; Gerber et al., 2020; Massarani, 2018; Revuelta, 2014). Moreover, science communication research is also characterised by its disconnect with its practice, as few collaborations have been detected between academics and professionals (Davies et al., 2021; Gerber et al., 2020; Metcalf, 2019; Trench; Bucchi, 2021). In terms of scientific production in the field of public communication of science, it is worth noting a few aspects: it is led by English-speaking countries (Peters, 2022), which is why some authors point out the need for greater collaboration between researchers (Massarani, 2018), especially in the Southern Hemisphere (Guenther; Joubert, 2017); time-wise, the publication of articles has grown steadily in recent years, specially in 2020 and 2021 (Parejo-Cuéllar et al., 2024; Peters, 2022); finally, although authorship in this field of research was mainly male in its early years, female authors have become more dominant in recent years (Guenther; Joubert, 2017).

1.2. Spanish Context

Research on the public communication of science has also developed in Spain in recent decades, albeit not as prolifically as in other countries (especially in English-speaking regions). Some examples of such academic works are those of López-Pérez and Olvera-Lobo (2017), who studied the history of the public communication of science in Spain (2017); Denia (2021), who investigated the country’s science communication on *Twitter* (now *X*) (2021); or Gertrudix et al. (2021), who explored the communication of the results of H2020 research projects (2021). Only two articles which focus on Spanish science communication research have been identified (González-Alcaide et al., 2009; Moreno-Castro, 2003). The number of academic papers and research studies undertaken by Spanish universities and research centres is growing and is expected to continue to increase, along with the international visibility of their authors (Revuelta et al., 2020). However, it is necessary to understand the current state of Spanish research on the public communication of science in much more detail to be able to analyse its evolution and, if necessary, design and implement actions for its promotion.

2. Objectives

For all the above-stated reasons, the main objective of this study is to analyse the current state of the research on the public communication of science in Spain. The specific objectives of this study are to: (1) identify the research groups in this field; (2) characterise these groups and their researchers; (3) explore current lines of research; (4) map academic collaborations, both nationally and internationally; (5) determine funding sources; and (6) identify research shortcomings. This study responds to a request made to the authors by the *Spanish Foundation for Science and Technology (FECYT)*, a public foundation belonging to the Spanish Government and its *Ministry of Science, Innovation and Universities*. The foundation is aiming to determine the state of the art of the research on the public communication of science, to make informed decisions addressing the furthering of Spanish scientific culture. Within the framework of

this project, the *FECYT* established a scientific advisory committee of nine experts in the public communication of science (five Spanish and four international; three men and six women).

3. Methodology

Two methods were applied for this study: (1) a content analysis of the information found on the websites of all Spanish universities regarding their research groups and (2) semi-structured interviews with science communication researchers working in Spain.

3.1. Content Analysis of the Websites of the Spanish Universities

According to official information from the *Spanish Ministry of Science, Innovation and Universities* (**Ministerio de Ciencia**, 2025), in 2025 there are 91 universities in Spain: 50 public (state-owned) and 41 private universities. Between 4 July and 9 September 2022, an exhaustive content analysis of publicly accessible information on the websites of all Spanish universities was conducted. On each website, the authors searched for information on research groups that were either exclusively dedicated to science communication research or that included the public communication of science amongst other research fields (hereinafter, this distinction is referred to as exclusively or non-exclusively dedicated to science communication research). The selection criteria was, therefore, whether a research group indicated in its website one or more research lines dedicated to the public communication of science. In total, 47 research groups were identified. Please note, between the original content analysis and the writing of this article, five new universities have been established in Spain, all of them private. Upon an exhaustive analysis of their websites, no new research groups have been identified that work either exclusively nor non-exclusively in science communication. For the content analysis, a database was created in which every registry unit corresponded to a research group. For each registry unit, the following variables were analysed:

1. Research group's name
2. University
3. Type of university (private or state)
4. Region ("autonomous community")
5. Province
6. University department
7. Group typology (recognised by local or state administration, others)
8. Group's projects
9. Principal investigator or group coordinator
10. Research staff (number of people)
11. Research lines (only registered those that were relevant to this study)
12. National journals in which they have published
13. International journals in which they have published

3.2. Interviews with Science Communication Researchers

A total of 21 interviews were conducted with researchers dedicated exclusively ($n=5$) or non-exclusively ($n=16$) to the public communication of science. Interviewees belonged to 18 research groups from 17 organisations. Interviewees were selected on the basis of the information obtained from the content analysis of the university websites, plus suggestions provided by the members of the project's scientific advisory committee. Other researchers were identified by the interviewees themselves, in a process known as "snowball sampling" (Creswell, 2001). The sample of interviewees is diverse on many fronts. Gender-wise, the sample is composed of 11 women and 10 men. In terms of background, interviewees most commonly studied Communication/Journalism ($n=6$) or Philosophy ($n=6$), followed by Psychology ($n=2$), Sociology ($n=2$) and Biology ($n=2$). Interviewees work in several university departments, mostly in Communication/Journalism departments ($n=9$) and Philosophy departments ($n=5$). Regarding the interviewees' careers, most of them have been in research for an extended period, that is, more than 10 years ($n=16$). In terms of geographical distribution, the interviewees work at universities and public research organisations in 12 different cities located in 10 Spanish regions. Madrid is the city in which most interviewees work ($n=7$). The research groups they belong to are mostly either 1–5 years old ($n=6$) or 11–15 years old ($n=5$). The interview

Two methods were applied for this study: (1) a content analysis of the information found on the websites of all Spanish universities regarding their research groups and (2) semi-structured interviews with science communication researchers working in Spain

In Spain, 47 groups carry out research in science communication. Out of these, 7 groups are dedicated to science communication research exclusively. The 47 groups identified are distributed across 15 Spanish regions

script explores four dimensions: (1) research group description (size, publications, funding sources); (2) relationships (national and international collaborations, main collaborators); (3) research lines (topics investigated, future research topics); and (4) shortcomings and recommendations (unmet needs, tools for the benefit of the sector, topics that are yet to be investigated).

Table 1: Research Groups of Interviewees.

Research Group	Organisation
Advanced Communication Studies (Estudios Avanzados de la Comunicación)	Universidad Rey Juan Carlos
Communication and Information Society (Comunicación y Sociedad de la Información)	Universidad de Málaga
Communication, Culture and Science (Comunicación, Cultura y Ciencia)	Universidad de Sevilla
Communication in the Valencian Community (Comunicación en la Comunidad Valenciana)	Universidad Miguel Hernández de Elche
Communication of Science (Comunicación de la Ciencia)	Universidad de Navarra
Creation and Psychosocial and Cultural Effects of the Audiovisual Discourse (Creación y efectos psicosociales y culturales del discurso audiovisual)	Universidad Complutense de Madrid
EDUtransforma-T	Universidad de Extremadura
Journalism and Social Communication (Periodismo y Comunicación Social)	Universidad de Murcia
Logic and Philosophy of Science (Lógica y Filosofía de la Ciencia)	Universitat de les Illes Balears
Metrics and Innovation in Science and Technology	Spanish National Research Council
Research Unit in Science, Technology and Society	Centre for Energy, Environmental and Technological Research
ScienceFlows	Universitat de València
Science and Technology Studies (Estudios sobre Ciencia y Tecnología)	Universidad de Salamanca
Science, Communication and Society Studies Centre (Centro de Estudios de Ciencia, Comunicación y Sociedad)	Universitat Pompeu Fabra
Science, Technology and Society	Spanish National Research Council
Social Studies of Science (Estudios Sociales de la Ciencia)	Universidad de Oviedo
Social Trust in Science and Technology (Confianza Social en Ciencia y Tecnología)	Universidad Autónoma de Madrid
Unit of Scientific Culture and Innovation	Universidad Carlos III de Madrid

Interviews were conducted between 12 July and 7 September 2022. The average duration of the interviews was 39:35 minutes, with a range from 30:41 to 47:23 minutes. They were conducted by one of the authors of this study (N.S.) via the video conferencing software *Zoom*. They were transcribed in August and September 2022 by external transcribers. The coding and qualitative analysis of the interviews was carried out by one of the authors of this study (N.S.) using the qualitative research support software *Atlas.ti* (version 22). After the interviews were conducted, a form was sent on 6 October 2022 to all interviewees to confirm the collaborations mentioned, and 19 of the interviewees responded (while 2 did not respond even after two reminders).

It can be stated that science communication research in Spain is a developing field, and it is mostly funded through national grants

4. Results

The results have been divided into two blocks: (1) research groups (findings from the content analysis of the websites) and (2) researchers (findings from semi-structured interviews).

4.1. Research Groups

In Spain, 47 groups carry out research in science communication. These groups belong to 31 universities and 2 public research organisations (OPI). Out of 47 groups, 7 are exclusively dedicated to science communication research (Table 2) whereas 40 are non-exclusively dedicated to the field (that is, they also carry out research in other areas) (Tables 3 and 4).

When asked about tools or platforms that could be the most beneficial for science communication research, interviewees most frequently refer to initiatives to promote researcher collaborations (n=8)

Table 2: University Research Groups Dedicated Exclusively to Public Communication of Science.

Research Group	Department	University	Region
Communication and Scientific Culture (COM-CIENCIA - Comunicació i Cultura Científica)	Communication Sciences	Universitat Jaume I	Valencian Community
Communication, Culture and Science (Comunicación, Cultura y Ciencia)	Journalism	Universidad de Sevilla	Andalusia
Communication of Science (Comunicación de la ciencia)	Audiovisual Communication and Journalistic Projects	Universidad de Navarra	Navarre
OpenSystems	N/A	Universitat de Barcelona	Catalonia
ScienceFlows	Language Theory and Communication Sciences	Universitat de València	Valencian Community
Science, Communication and Society Studies Centre (Centro de Estudios de Ciencia, Comunicación y Sociedad)	Medicine and Life Science	Universitat Pompeu Fabra	Catalonia
Two Cultures Observatory (Observatorio de las dos culturas)	Language Theory and Communication Sciences	Universitat de València	Valencian Community

Table 3: University Research Groups Dedicated Not-exclusively to Public Communication of Science

Research Group	Department	University	Region
Access and Evaluation of Scientific Information (Acceso y evaluación de la información científica)	Information and Communication	Universidad de Granada	Andalusia
Advanced Communication Studies (Estudios Avanzados de la Comunicación)	Journalism and Corporate Communication	Universidad Rey Juan Carlos	Madrid
Analytics, Media and Public Engagement: Communication, Journalism and Technology Laboratory (UC3M MediaLab)	Communication	Universidad Carlos III de Madrid	Madrid
Asterisk (Asterisc)	Communication studies	Universitat Rovira i Virgili	Catalonia
Audiovisual Communication Research (Investigación en Comunicación Audiovisual)	Communication and social psychology	Universidad de Alicante	Valencian Community
Bioethics and Biopolitics (Bioética y biopolítica)	History and Philosophy of Science, Education and Language	Universidad de La Laguna	Canary Islands
Ciberimaginary (Ciberimaginario)	Audiovisual Communication and Advertising	Universidad Rey Juan Carlos	Madrid
Communication and Information Society Studies (Estudios sobre Comunicación y Sociedad de la información)	Journalism	Universidad de Málaga	Andalucía
Communication and Digital Society (Comunicación y Sociedad Digital)	Communication	Universidad Internacional de La Rioja	La Rioja
Communication and Specific Audiences (Comunicación y Públicos Específicos)	Communication and social psychology	Universidad de Alicante	Valencian Community
Community Health (Salud Comunitaria)	Community Nursing, Preventive Medicine and Public Health and History of Science	Universidad de Alicante	Valencian Community
Creation and Psychosocial and Cultural Effects of the Audiovisual Discourse (Creación y efectos psicosociales y culturales del discurso audiovisual)	Communication theories and analyses	Universidad Complutense de Madrid	Madrid
Critical Studies on Communication (Estudios Críticos Sobre La Comunicación)	Philology	Universidad de Almería	Andalusia
Critical View (Mirada Crítica)	Psychology	Universidad de Castilla-La Mancha	Castile-La Mancha
Dialectical mediation of social communication (Mediación dialéctica de la comunicación social)	Sociology	Universidad Complutense de Madrid	Madrid
EDUtransfórma-T	Education	Universidad de Extremadura	Extremadura
Evaluation and Dissemination of Science, Promotion of Knowledge of Research Methodologies and Academic Communication (Evaluación y divulgación de la ciencia, fomento del conocimiento de las metodologías de investigación y comunicación académica)	History of Science and Documentation	Universitat de València	Valencian Community
Health Sciences Research Group (Grupo de investigación en Ciencias de la Salud)	Nursing, Physiotherapy and Medicine	Universidad de Almería	Andalusia
History, Archaeology, Documentation and Culture (Historia, Arqueología, Documentación y Cultura)	Humanities	Universidade da Coruña	Galicia
History, Current Practices and New Challenges of Scientific Knowledge Transfer (Historia, prácticas actuales y nuevos desafíos de la transferencia de conocimiento científico)	History of Science and Documentation	Universitat de València	Valencian Community
History of Science, Health Care and Nutrition (Historia de la Ciencia, Cuidados en Salud y Alimentación)	Humanities	Universidad de Alicante	Valencian Community
Interactive Media Lab (Laboratorio de Medios Interactivos)	Communication	Universitat de Vic - Universitat Central de Catalunya	Catalonia
Journalism and Social Communication (Periodismo y Comunicación Social)	Information and Documentation	Universidad de Murcia	Murcia
Journalistic Writing: Styles, Narratives, Genres (Redacción periodística: estilos, narrativas, géneros)	Journalism and global communication	Universidad Complutense de Madrid	Madrid
Media, Society and Education (Hedabideak, Gizarte eta Hezkuntza)	Journalism	Universidad del País Vasco	Basque Country
Mediation and Communication (Mediación y Comunicación)	Audiovisual Communication and Advertising	Universidad Rey Juan Carlos	Madrid
METIS Group (Grupo METIS)	Logic, History and Philosophy of Science	Universidad Nacional de Educación a Distancia	National
Philosophical Analysis and Scientific Knowledge (Análisis filosófico y conocimiento científico)	Philosophy and Social Work	Universitat de les Illes Balears	Balearic Islands
PRAXIS research group (Grupo PRAXIS)	Philosophy	Universidad del País Vasco	Basque Country
Research Centre for Science and Mathematics Education (Centro de investigación para la Educación Científica y Matemática)	Didactics of Mathematics and Experimental Sciences	Universitat Autònoma de Barcelona	Catalonia
Research Group in Science Communication (Grupo de Investigación en Comunicación Científica)	Communication	Universitat Pompeu Fabra	Catalonia
Research Group in Communication in the Valencian Community (Grupo de Investigación de la comunicación en la Comunidad Valenciana)	Social sciences and Humanities	Universidad Miguel Hernández de Elche	Valencian Community
Science and Technology Studies (Estudios sobre ciencia y tecnología)	Philosophy, Logic and Aesthetics	Universidad de Salamanca	Castile and León
Science, Technology, and Medicine in the twentieth century	Philosophy	Universitat Autònoma de Barcelona	Catalonia
Social Studies of Science (Estudios Sociales de la Ciencia)	Philosophy	Universidad de Oviedo	Asturias
Social Trust in Science and Technology (Confianza social en Ciencia y Tecnología)	Sociology	Universidad Autónoma de Madrid	Madrid
Technology, Art, Documentation and Communication (Tecnología, Arte, Documentación y Comunicación)	Journalism	Universidad de Sevilla	Andalusia

Table 4: Research Groups in Public Research Organisations Dedicated to Science Communication (all non-exclusively).

Research Group	Organisation	Region
Metrics and Innovation in Science and Technology	Spanish National Research Council - Institute of Public Policies and Goods	Madrid
Research Unit in Science, Technology and Society	Centre for Energy, Environmental and Technological Research	Madrid
Science, Technology and Society Research Group	Spanish National Research Council - Institute of Philosophy	Madrid

4.1.1. Geographic Distribution

The 47 groups identified are distributed across 15 Spanish regions (also called “autonomous communities”). The ones with the largest concentration of groups are the regions of Madrid ($n=11$), the Valencian Community ($n=10$), Catalonia ($n=7$) and Andalusia ($n=6$). One research group belongs to a state-wide university and has therefore not been allocated

to any specific region. No research groups were identified in the two regions of Aragon and Cantabria, nor in the two autonomous cities of Ceuta and Melilla. The regions of Valencia ($n=3$) and Catalonia ($n=2$) have the highest number of research groups exclusively dedicated to the public communication of science, and the regions of Madrid ($n=11$), Valencia ($n=7$), Catalonia ($n=5$) and Andalusia ($n=5$) have the highest number of research groups non-exclusively dedicated to the public communication of science (Illustration 1).

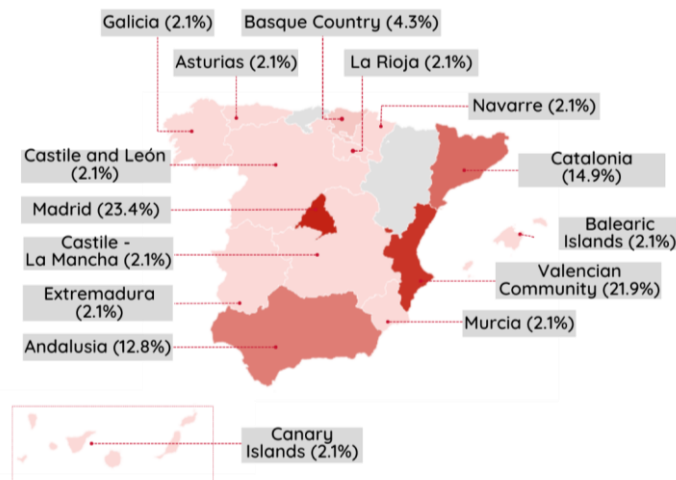


Illustration 1: Geographic Distribution of Public Communication of Science Research Groups in Spain.

4.1.2. Departments and Disciplines

The identified groups belong to a variety of university departments and disciplines, which overall include Communication/Journalism (50.0%), Philosophy (15.9%), Medicine and life sciences (9.1%), Humanities and social sciences (6.8%), Education (4.5%), History of science (4.5%), Sociology (4.5%) and Philology (2.3%). Figure 1 shows the distribution of university departments to which the groups belong, separated according to whether they are dedicated exclusively and non-exclusively to the public communication of science.

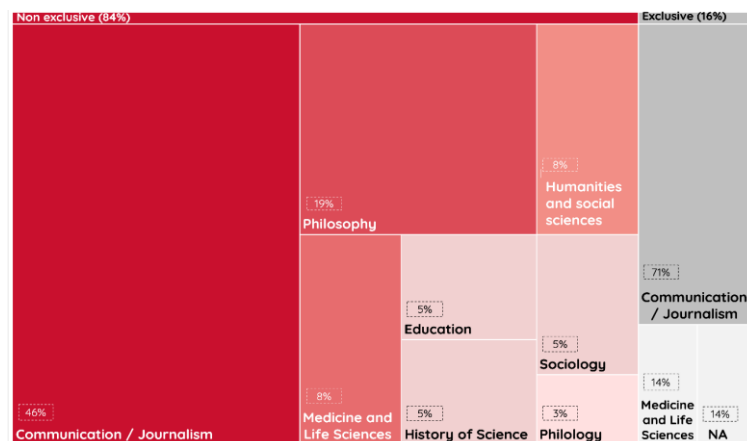


Figure 1: Departments of the Research Groups Exclusively (grey) and Non-exclusively (red) Dedicated to the Public Communication of Science.

4.1.3. Group Size

The seven research groups exclusively dedicated to the public communication of science are small: the most frequent group size is between 1 and 5 people ($n=3$). The 40 research groups non-exclusively dedicated to science communication are larger, with two equally frequent size categories: between 16 and 20 people ($n=12$) and between 6 and 10 people ($n=11$) (Table 5).

Table 5: Sizes of Exclusively and Non-exclusively Dedicated Research Groups.

Group Size (number of people)	Exclusively Dedicated		Non-exclusively Dedicated	
	Frequency	%	Frequency	%
1–5	3	42.9%	6	15.0%
6–10	2	28.6%	11	27.5%
11–15	1	14.3%	4	10.0%
16–20	1	10.0%	12	30.0%
>20	0	0.0%	7	17.5%

4.1.4. Research Lines

On their websites, the identified research groups mention 106 lines of research related to the public communication of science. These have been grouped into 24 different areas, with the main ones being science communication (17%), health communication (9.4%) and science dissemination (8.5%) (Table 6).

Table 6: Research Lines of Identified Groups (5 or more mentions).

Research Line	Frequency	%
Science communication	18	16.98%
Health communication	10	9.43%
Science dissemination	9	8.49%
Science, technology and society studies (STS)	7	6.60%
Philosophy of science and technology	7	6.60%
Public perception of science	6	5.66%
Environmental communication	6	5.66%
Scientific culture	5	4.72%
Citizen science	5	4.72%

4.2. Researchers

The results of the analysis of the 21 semi-structured interviews with science communication researchers are presented below. The majority of the interviewees ($n=16$) work in groups non-exclusively dedicated to the public communication of science.

4.2.1. Research Lines of Interviewees

When asked “What are your main research lines?”, interviewees mentioned 38 different lines of research (Table 7). These lines can be grouped into three blocks: (a) those that refer to specific aspects of science communication; (b) those that focus on platforms, media or formats of science communication; and (c) those that analyse the communication of a specific area of science. With regard to the first block, the most frequently mentioned topic is public perception of science (10.6%), followed by disinformation (7.7%) (including the analysis of fake news, especially since the Covid-19 pandemic). Regarding the second block, the most researched media or platforms are mass media (11.5%) and social networks (7.7%). Regarding the third block, the most researched areas are health communication (5.8%) and environmental communication (5.8%).

Table 7: Interviewee’s Main Research Lines (five or more mentions).

Block	Research lines	Frequency	%
Specific aspects of science communication	Public perception of science	11	10.6%
	Disinformation	8	7.7%
	Impact	6	5.8%
Platforms, media or formats	Mass media	12	11.5%
	Social networks	8	7.7%
Topics	Health communication	6	5.8%
	Environmental communication	6	5.8%

When asked “What would you like to research in the future?”, interviewees mentioned 33 topics. The most frequently mentioned topic was environmental communication ($n=5$). When asked about what topics are understudied, interviewees mentioned the need to research people and communities in detail ($n=3$), disinformation ($n=2$) and impact studies ($n=2$).

“If the field of science communication is going anywhere, I think it is towards (...) understanding how to communicate for more specific profiles. Of course, to do that (...) first you have to recognise them and know where they are.” – Interview 14

“How science communication impacts people’s behaviour (...). It is a very important field and there is little or nothing done about it.” – Interview 5

4.2.2. Collaborations

Regarding their national collaborations, interviewees mention 40 different organisations. The top ten organisations account for more than half of all the collaborations (55.6%). The organisation mentioned the most (10.6%) is the Spanish Foundation for Science and Technology (FECYT). The second most commonly mentioned organisation (7.2%) is the Spanish National Research Council (CSIC), a public research institution affiliated with the Spanish Government and its Ministry of Science, Innovation and Universities. Regarding their international collaborations, interviewees refer to researchers from 13 different countries. In total, they cited 21 researchers (5 women and 16 men) from around the world. The most cited countries were the United Kingdom (19 mentions) and the United States (12 mentions).

4.2.3. Funding

The main source of funding for research on the public communication of science mentioned by interviewees is national

funding (19 mentions, 31.7%). This includes funding from different Spanish ministries, such as the Ministry of Health, Ministry of Science and Innovation and Universities, as well as the funding agent FECYT (which falls under the auspices of the Ministry of Science, Innovation and Universities). Other sources of funding are regional grants (seven mentions, 11.7%), European funding (seven mentions, 11.7%) and funding from private companies (seven mentions, 11.7%) (Figure 2).

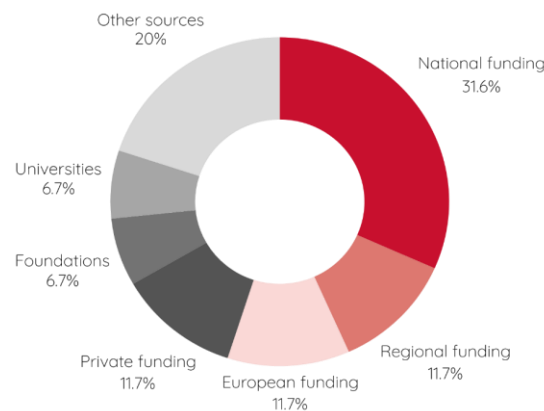


Figure 2: Main Funding Sources Mentioned by Interviewees.

4.2.4. Research Shortcomings

When asked “Do you think that science communication research has any unmet needs or shortcomings?”, interviewees mentioned 61 different issues. The main shortcomings identified relate to the following themes: structural problems of the research system ($n=22$), lack of funding ($n=11$), lack of interdisciplinarity ($n=7$), lack of collaboration among researchers ($n=7$) and lack of research training ($n=4$) (Table 8).

Table 8: Identified Shortcomings Mentioned by Interviewees, Grouped by themes (4 or more mentions).

Shortcoming	Frequency	%
Structural problems of the research system	22	36.1%
Lack of funding	11	18.0%
Lack of interdisciplinarity	7	11.5%
Lack of collaboration among researchers	7	11.5%
Shortcomings related to research training	4	6.6%

The main issues regarding the structural problems of the research system are the lack of institutional support ($n=5$), lack of time ($n=3$) and the need for better working conditions ($n=2$).

“Spanish research advances thanks to the will of researchers (...), because the administration sometimes seems to be against you.” – Interview 14

“If there is no financial support or resources (human or material) (...), it is impossible to do anything well. If you want research, you will have to set up laboratories. If you want research in science communication, you will have to provide tools.” – Interview 19

Regarding the lack of funding, the main issues are resource scarcity ($n=5$) and calls for grants that do not understand the reality of research in science communication ($n=4$).

“I think that researchers in Spain are heroes, because with the few resources they have, they can be relatively competitive.” – Interview 14

“One of the main issues we have [with calls for grants] is that they don’t recognise the relationship with society.” – Interview 18

Regarding the lack of interdisciplinarity, the main issues are that it is not fully understood and ends up being penalised by evaluation committees.

“There is a lot of talk about interdisciplinarity, but in practice, evaluation committees are strictly disciplinary. And so, new perspectives and interesting projects often fall by the wayside and don’t get approved because they are not understood.” – Interview 5

“Interdisciplinarity in Spain is only wishful thinking. I believe that our discipline [science communication] is one of the clearest hybrid examples of possible collaboration between social sciences and humanities and natural sciences, and yet we have not been able to take advantage of it.” – Interview 13

Regarding the lack of collaboration among researchers, interviewees complain that there is no coordination,

collaboration or mutual recognition in science communication research.

"I wish there was greater coordination at a national level. That is, more contact between all the researchers who are working in the field." – Interview 10

"There have been some occasional collaborations, but we are very heterogeneous, because the field is miscellaneous and there is not much group hybridisation (...). Perhaps we are lacking more interactions." – Interview 13

Regarding research training shortcomings, interviewees mention that specific training in research on the public communication of science is needed both during undergraduate studies as well as during career development.

"The first, really imperative need is training in research. People who are trained in the area of communication do not know about research." – Interview 15

"We have had to learn research methodologies and programmes on our own. And this requires many years, a lot of effort (...). It would be ideal if there were training available, or the possibility of accessing more methodological training." – Interview 21

4.2.5. Beneficial Tools or Platforms

When asked about tools or platforms that could be the most beneficial for the research on public communication of science, interviewees most frequently refer to initiatives to promote researcher collaborations ($n=8$).

"We should create, I don't know whether a database, a website, an annual conference, I don't know, but we should certainly keep ourselves informed with what we are all doing." – Interview 12

"We need tools that allow us to work between institutes and groups in an agile way. (...) Sometimes, to undertake high-quality research, you need researchers from all kinds of organisations." – Interview 4

5. Discussion and Conclusions

This study presents the state of the art of the research on the public communication of science undertaken in Spain. A total of 47 research groups have been identified, distributed throughout the country across 15 regions. Most groups are not exclusively dedicated to the field, but rather study it together with other topics. Only seven groups are exclusively dedicated to this subject matter. Thus, it can be stated that science communication research in Spain is a developing field. The identified research groups are mostly found in Communication/Journalism university departments, although there is representation from a wide variety of disciplines. This study coincides with the diversity of research practice documented in the international literature (Guenther; Joubert, 2017; Peters, 2022; Trench; Bucchi, 2010) but provides an exhaustive analysis of all universities in a country, something that had not been done until now.

The research lines identified by the content analysis aligned with traditional science communication studies, such as science communication itself, as well as health communication or public perception of science. The interviews revealed further details regarding specific research lines to be discerned, such as analysis of the media, misinformation or the impact of communication. The research lines referenced in the interviews coincide with those identified in the international literature (Gerber *et al.*, 2020). The lines that appear both in the content analysis and in the interviews are health and environmental communication and public perception of science, probably because these are two of the areas with the longest research history in Spain.

Collaboration networks of science communication research are poorly consolidated and tend to be concentrated in a few organisations. National collaborations converge geographically in the city of Madrid: four of the five most commonly mentioned organisations are located there. The two most commonly mentioned organisations, however, are national institutions: the *Spanish Foundation for Science and Technology (FECYT)* and the *Spanish National Research Council (CSIC)*. International collaborations are established mainly with the United Kingdom and the United States. It is surprising to note that interviewees barely mention collaborations with other Spanish-speaking researchers, although we are aware that these exist (such as with *Universidad del Norte* in Colombia, *Universidad Nacional Autónoma* in Mexico or *Universidad Nacional de Quilmes* in Argentina). The reasons behind the infrequent mentions of other Spanish-speaking researchers provide an avenue for further research.

The main shortcomings of science communication research are structural; in particular, researchers point out a lack of organisational support, time constraints and their working conditions

Research on the public communication of science in Spain is mostly funded through national grants. Other sources include regional grants, European projects and private companies. Accessing these kinds of funding is often limited by the organisational support available to the research groups, as well as their business connections.

The main shortcomings of science communication research are structural; in particular, researchers point out a lack of

organisational support, time constraints and their working conditions. Other relevant shortcomings are lack of funding, insufficient interdisciplinarity, lack of research collaborations and the need for more training in research.

5.1. Limitations

This work has two limitations. It is possible that the content analysis of the university websites may be incomplete, since it was based on what they publish and thus might not be current or could leave out some groups that are actually researching on the field but did not include it on their website. Moreover, three research groups, as well as one of the regions, are overrepresented within the semi-structured interviews. This could have implications regarding the interviewees' research lines or collaborations.

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