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Science journalism in the current digital ecosystem: challenges and alerts from the perspective of Chilean professionals

El periodismo científico en el actual ecosistema digital: retos y alertas desde la perspectiva de los profesionales chilenos

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Abstract

Science journalism is in an ongoing process of digitisation, so it is necessary to have analyses that allow understanding of the current reality of the discipline and awareness of future trends and difficulties. Due to the fact that the consideration given to science journalism in Latin America is not uniform across the different regions, this study seeks to determine how science journalists in Chile are performing in the new digital scenario. By using the "snowball" technique, a survey was disseminated with questions associated with professional practice, which enable evaluation of the work of the discipline in the country. The 42 participating journalists highlighted the importance of using scientific language appropriately and the use of social networks to communicate with audiences. They also warned about the challenge encountered by local science journalism in facing the misinformation that is shared in the digital environment, as well as the ongoing specialisation in content and the qualified use of technologies that professionals in the field must develop. This research reveals the need for journalists to have greater versatility and knowledge of the new channels through which the public is informed, and thereby take advantage of the current boom in the consumption of science news by citizens.

Keywords

Science communication; new media; journalistic profiles; science journalism; digital journalism; social media

Resumen

El periodismo científico se encuentra en un constante proceso de digitalización, por lo que se hace necesario contar con análisis que permita entender la realidad actual de la disciplina y estar atentos a las tendencias y dificultades futuras. Ante el hecho de que la consideración que se le presta al periodismo científico en América Latina no es uniforme entre las diferentes regiones, el presente estudio persigue determinar cómo los periodistas científicos de Chile están desempeñándose en el nuevo escenario digital. Por medio de la técnica de "bola de nieve", se difundió una encuesta con preguntas asociadas al ejercicio profesional, las cuales permiten evaluar la labor de la disciplina en el país. Los 42 periodistas participantes destacaron la importancia de usar adecuadamente el lenguaje científico y saber utilizar de forma apropiada las redes sociales para comunicarse con las audiencias. Además, alertaron sobre el desafío que se le presenta al periodismo científico local para enfrentar las desinformaciones que se comparten en el entorno digital, así como la constante especialización en contenidos y el empleo cualificado de tecnologías que deben desarrollar los profesionales en la materia. Esta investigación pone de manifiesto la necesidad de que los periodistas tengan una mayor versatilidad y conocimiento de los nuevos canales por los que se informan los públicos y así aprovechar el auge actual del consumo de noticias de ciencia por parte de la sociedad.

Palabras clave

Comunicación de la ciencia; nuevos medios; perfiles periodísticos; periodismo científico; periodismo digital; redes sociales

1. Introduction

Throughout its history scientific activity and technology has permitted the development of societies and nations, creating new knowledge, better education and increasing people's quality of life. However, the appropriate positioning of this content in the media and news agendas has been an arduous task. It is thus normally the case that topics associated with discoveries in the fields of astronomy or medicine, or certain technological advances, are those that sometimes manage to occupy a reduced space in the lines of the communications media (Dunwoody, 2015), whereas others simply do not see the light of day.

The COVID-19 pandemic, the climate crisis and the fight against misinformation in the health field have further highlighted the importance of the public communication of science and, in effect, the value science journalism can have in times of crisis. This is especially true in the case of the work carried out in the newsrooms of media outlets, institutions, organisations and on the part of researchers. This all has a clear objective, which is to give society the possibility of accessing extensive science and technology information that allows it to understand the problems being experienced in the world and discover the solutions afforded by scientific progress (Vernal-Vilicic and Valderrama-Zenteno, 2022).

Journalism has in recent years been more intensively immersed in a major digitalisation process as regards information production and communication systems, with new models of innovation and multimedia convergence (Sánchez-Gonzales, 2022) that have accelerated with the pandemic. Living in a hyper-connected society (Bustos Díaz and Ruiz del Olmo, 2020), in which social media have taken on a key role, has meant that attention has increasingly been focused on what is occurring on these platforms, thus taking advantage of the favourable circumstances for more effective communication. In this way the goal is not just to interact with other users, rather to incorporate them as a tool for professional practice and for communicating with ever more segregated audiences (Mellado, 2022).

In the face of such challenges, it is evident there is a need for studies focused on the analysis of professional profiles linked to the practice of science journalism (Kristiansen, Schäfer and Lorencez., 2016; Cassany, Cortiñas and Elduque, 2018; Vernal-Vilicic et al., 2019; Smith and Morgoch, 2020) in order to examine the current reality of the discipline and be attentive to tendencies and difficulties that appear on the horizon. In an environment increasingly populated by challenges and opportunities in the communications sphere, it becomes imperative to discover how journalists in this area are confronting these circumstances. In the particular case of Chile, considering the difficulties and shortcomings in the working conditions that can exist in the profession (Greene-González, Cerda-Diez and Ortiz-Leiva, 2022), these assessments become a key element for establishing action strategies that contribute towards confronting present and future challenges.

1.1. Journalistic roles in the digital society

The new increasingly immediate and changing forms of communication in the digital realm have led to a demand for journalists to constantly acquire new skills, responsibilities and roles when it comes to doing their job (Reyes-de-Cózar, Pérez-Escolar and Navazo-Ostúa, 2022). The media industry, alert to these modifications, requires versatile professionals who are able to produce multiplatform, interactive and multimedia content (Mayo-Cubero, 2022). However, the technological revolution and the training journalists must acquire to face it must be accompanied by a professional practice focused on quality that permits, in this way, an improvement in skills and abilities on the part of communicators (Marta-Lazo, Rodríguez-Rodríguez and Peñalva, 2020).

Digitalisation is not, however, a new process. It began prior to the advent of the Internet and with the inclusion of the first computers that started to support the professional practice. Nevertheless, and as a result of the accelerated technological changes of society and the natural adaptation to the world of the web, this era has given rise to a change in mentality and greater use of interactive platforms that involve the user, making this communication increasingly bidirectional (González-Pedraz and Campos-Domínguez, 2017, Sánchez-Gonzales, 2022) and situating digital development processes at the heart of the strategic plans of journalistic businesses.

One of the fundamental aspects of these new profiles has been the inclusion of social media, not only for spreading information, but also as a structure that permits communication with audiences and makes journalism a "more social and transparent" model, as argued by Martínez-Sanz and Arribas-Urrutia (2021: 151). Such an approach has permitted the cultivation of a community role that is constantly searching for solutions to people's day-to-day problems (Mellado, 2022). Accordingly, the role of the journalist on social media is fundamental, and is shown as a bridge for helping the public to process verified information in the face of the overwhelming amount of content circulating on the platforms, which often lacks precision (Sixto García, Vázquez-Herrero and López-García, 2022).

Science journalists have undoubtedly maintained their task as professionals entrusted with "revealing and demystifying the codes surrounding science" (Tabja-Salgado, Broitman-Rojas and Camiñas-

Hernández, 2017: 1127) and as effective sources for transmitting progress in the field to society (Schultz, 2023) using all traditional and emerging media to do so. They tend to be increasingly given to involving themselves in the digital world, attending both to the potential offered by communicating science via platforms that arise on the web, and the willingness shown by audiences towards accessing this content (Jarreau and Porter, 2018). This is despite the fact that this digital world, which is committed to the immediate and constructed by throw-away information, has not been considered acceptable by some professionals to the extent that they criticise how the continuous demand for information they face stops them from carrying out an educational task in adequate conditions (Kristiansen, Schäfer and Lorencez, 2016; Cassany, Cortiñas and Elduque, 2018; Maiden et al., 2020). Even so, the influence that the elements that converge in the digital ecosystem have had on the discipline cannot be ignored (Dunwoody, 2015; Massarani et al., 2022).

One of the main roles of the communicator in the digital ecosystem is, however, more than simply knowing how to manage and use social media. As has been widely documented, the new science journalist profile includes being able to manage aspects associated with big data, artificial intelligence and verification tools, as well as knowing how to access and process information published in prestigious journals or preprints to reach more audiences (Hansen, 2016; Maiden et al., 2020; Massarani et al., 2021b; Herrero-Diz, Pérez-Escolar and Varona-Aramburu, 2022; Schultz, 2023). Nor can it be forgotten that the science journalist has been required to take on an important multimedia and data analysis function in this context, with an increasing convergence, therefore, of the role of journalist, programmer, graphic designer and other analysts who did not previously work with communicators (Romero-Luis, Carbonell-Alcocer and Gétrudix Barrio, 2020; González Alba, 2021; Martín-Neira, Trillo-Domínguez and Olvera-Lobo, 2023c). These skills acquired by journalists have also been boosted with the turning point of the coronavirus pandemic, a health context that has accelerated digitalisation in journalism and imposed new challenges on the profession (Sánchez-Gonzales, 2022).

1.2. COVID-19 and changes for science journalism

The pandemic has, precisely, been a new wakeup call that has exposed journalism and the entire media system to new communicational challenges (Mellado et al., 2021), added to the increase in the consumption of scientific information and the need for this type of content to be explained clearly to mass audiences (Martín-Neira, Trillo-Domínguez and Olvera-Lobo, 2023a; Maniou and Papa, 2023). Let us remember that we are now facing a phenomenon known as an infodemic, which obliges journalism to constantly fight against misinformation and offer contrasted and official sources to the audience, ratifying the importance of science and technology in people's daily lives, and as a reliable communication tool (Fürst, 2021; Herrero-Diz, Pérez-Escolar and Varona-Aramburu, 2022). At the same time, it may be reaffirmed that science journalists are suitable mediators for interpreting key aspects of the pandemic in a useful manner (García-Avilés et al., 2022).

The progress of the disease invited science journalism to delve into more practical methods for communicating the subject, drawing attention to everyday examples to refer to the consequences of the pandemic, telling stories that were part of the daily experiences of the population and using different visual resources in the news (Diviu-Miñarro and Cortiñas-Rovira, 2020). Access to sources also changed. The Global Science Journalism Report 2021 (Massarani et al., 2021a), one of the leading publications on the working conditions of science journalists around the world, reveals that researchers themselves who are part of the scientific system have been more accessible in the aftermath of the pandemic and prepared to discuss health content. Moreover, the report acknowledges that scientific articles and official institutions in the health sector have become one of the main references when transmitting science content.

Although the use of social media and instant messaging has for a number of years been one of the main sources of information (López-Rico, González-Esteban and Hernández-Martínez, 2020), following the pandemic there has been an increase in the consumption of news via these channels. Such dynamics have contributed, in a context of an overabundance of information, to users tending to confuse what is true and what is not on these platforms, increasing the proliferation of false over true content (León, López-Goñi and Salaverria, 2022). We are facing profound changes in communication processes that have contributed to the role of science journalism being valued as a weapon against the false content emanating from these platforms (Martín-Neira, Trillo-Domínguez and Olvera-Lobo, 2023d). On the one hand, this new remit allows it to help to determine what might be "truths, half-truths and misinformation" (Molina-Cañabate and Magallón-Rosa, 2020: 12) and, on the other hand, to adopt a relevant role as a verifier of misinformation with a greater knowledge of big data and social media use on the part of its professionals (Herrero-Diz, Pérez-Escolar and Varona-Aramburu, 2022).

1.3. The professional practice of the science journalist in Chile

Chilean journalists themselves have not hesitated to categorise their professional practice as a precarious activity, whether it be in terms of employment, salary, working hours or tools for professional

development. Added to this is an uncertain employment context, with a profession mired in a crisis of mistrust and reputation on the part of some audiences, where it is often said that communicators are disconnected from the public (Grassau, Porath and Ortega, 2021; Mellado et al., 2021). Furthermore, it is important to draw attention to the fact that the structure of the media in Chile stands out for offering media outlets that are geographically centralised (managed from the capital, Santiago) and linked to political and economic power (Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2022b).

Shortcomings and difficulties are not dispelled when it comes to the discipline of science, as the dissemination of news linked to science and technology content has not been particularly noteworthy in the Chilean press (Parodi and Ferrari, 2007; Valderrama-Zenteno, 2014). While the COVID-19 pandemic caused the media and institutions that work with scientific matters to turn to disseminating health information, and thereby increase coverage (Mila-Maldonado and Soengas-Pérez, 2021), there was also a rise in levels of mistrust in digital, print and television media when reporting on coronavirus (Mellado et al., 2021). It is under this spiral of suspicion and misinformation that science communication has become an important tool for fighting against all types of news confusion and providing evidence to public spheres (Massarani and Oliveira, 2022).

From the professional praxis, the appropriate tools for achieving an effective communication of scientific content do not necessarily exist. Added to the reduced space in the media, a lack of tools and regulated training reduce the possibilities journalists have of engaging more effectively with local scientists and researchers (Valderrama-Zenteno, 2014; Vernal-Vilicic et al., 2019; Calvo-Rubio and Ufarte-Ruiz, 2021). Proof of this is that national experts have not hesitated in classifying the dissemination of science that occurs in Chile as "poor" (Tabja-Salgado, Broitman-Rojas and Camiñas-Hernández, 2017: 1126).

In parallel, and taking into account the high penetration of social media in Chile, the scientific communication carried out on these platforms is weak. Of the approximately 19 million people living in the country as of January 2023, 84.4% of the total population used some kind of platform (Kemp, 2023). Despite this penetration, there is no evidence of efficient communication on the part of the media outlets or outreach centres via these applications. An example of this is how Chilean science institutions tend to abuse the social networks with generic (institutional) information that lacks novelty, dealing with the day-to-day activity of the centre. Chilean journalists themselves hold that the content they publish on Instagram is not necessarily the most effective for attracting audiences (Martin-Neira, Trillo-Domínguez and Olvera-Lobo 2022a). Similarly, the media are not taking advantage of an emerging network such as TikTok, and science messages are copies of other platforms, with a failure to use the audiovisual opportunities offered by this application (Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2023b).

2. Objectives

Starting out from the need to carry out an exploration of Chilean science journalism, which may be illustrative and translatable to other professional realities and geographical areas, the objective of this work is to determine the way in which science journalists in Chile are carrying out their activity on the new post-pandemic digital stage. The aim focuses on identifying the challenges the discipline faces in this new professional context, exploring in-depth experiences and perceptions on topics associated with professional skills, the use of technological tools and the influence of misinformation in the daily practice, among other concerns.

Thus, the objective is to obtain answers to the following research questions:

Q.1: What are the challenges and opportunities facing science journalism in Chile in the current digital and media ecosystem?

Q.2: What are the characteristics, in terms of strategies, skills and roles, in the use of social media in Chile as a science communication tool?

Q.3: What is the communicative setting on the new media stage facing science, journalism and citizens in Chile?

3. Methodology

Taking into consideration experiences such as those of Valderrama-Zenteno (2014) and Vernal-Vilicic et al., (2019), focused on describing science journalism in Chile, this study contemplates a detailed analysis of the professional practice of Chilean science journalists in the digital society. It thus seeks to identify, from the perspective of its own principal actors, the opportunities and challenges faced by the discipline following the COVID-19 crisis, weighing difficulties and challenges for its exercise.

To this end, and taking as a reference such works as those of Cassany, Cortiñas and Elduque (2018), Cabrera-Méndez, Codina and Salaverría (2019) and Martin-Neira, Trillo-Domínguez and Olvera-Lobo

(2022a), a survey structured around closed and open-ended questions has been designed, shown in Table 1. The questions for the purpose of gathering general information and characterising the sample were implemented using multiple choice, restricting responses to a single option (Hernández and Roldan, 2022). Furthermore, a series of closed alternative questions were included, permitting respondents to select the most appropriate option (García-Alcaraz et al., 2006). The survey also contained questions for evaluating aspects associated with professional practice, applying the Likert scale (Matas, 2018), facilitating the discovery of the participants' degree of conformity with the proposed statements (Sanz-Hernando and Parejo-Cuéllar, 2021). Lastly, three open-ended questions were applied, which encouraged respondents to develop their response and elaborate their assessment of the professional task in the country.

The data collection instrument was aimed at journalists and Social Communication graduates who, at the time of completing the survey, were in roles directly related to the exercise of journalism and the communication of science and technology in Chile, specifically in four complementary areas: i) the science and technology sections of the media, ii) press offices and scientific projects or institutions in the country, iii) universities, either through teaching, or in areas of extension, iv) and independent (freelance) journalists. The survey was developed following an internal pretest debate and validation process applied to the sample design, data collection and subsequent analysis, which is sustained on the extensive experience of the authors of this study as specialists in the area of communication and evaluation.

Table 1: Description of the study survey

Question	Answer
Questions of a general nature	
Do you give your authorisation for your data to be used anonymously for the exclusively purpose of this study?	Yes No
Year qualified as a journalist (or graduate in social communication):	
What is your level of education?	1. Undergraduate 2. Undergraduate and diploma 3. Incomplete postgraduate (master, magister) 4. Complete postgraduate (master, magister) 5. Incomplete PhD 6. Complete PhD
In what area of science journalism do you work? Choose one only, in relation to your main job or that which best adapts to your reality	1. Journalism in written media 2. Journalism in digital written media 3. Journalism in radiophonic media 4. Journalism in televisual or audiovisual media 5. Institutional journalism 6. Academy or teaching 7. Independent 8. Others
For how long have you been working in the area of science journalism?	1. Under 6 months 2. Between 6 months and under 1 year 3. Between 1 year and under 2 years 4. Between 2 years and under 5 years 5. Between 5 years and under 10 years 6. Between 10 years and over

In what region do you work or carry out the majority of your tasks?

1. Arica y Parinacota
2. Tarapacá
3. Antofagasta
4. Atacama
5. Coquimbo
6. Valparaíso
7. O'Higgins
8. Maule
9. Ñuble
10. Biobío
11. Araucanía
12. Los Ríos
13. Los Lagos
14. Aysén
15. Magallanes
16. Metropolitana
17. I work in two or more regions
18. I live outside Chile

In what age group are you?

1. 22 to 30
2. 31 to 40
3. 41 to 50
4. 61 to 60
5. 60 or above

What is your gender identity?

1. Female
2. Male
3. Other identity
4. I prefer not to say

Questions on professional practice

What skills or elements do you consider essential for science journalism today? (Select the three main ones from each block)

On training and tools:

- Social media use
- Data verification tools
- Audiovisual editing knowledge (video and podcast)
- Knowledge of constructive journalism and solutions
- Knowledge of SEO journalism
- Knowledge for incorporating artificial intelligence
- Knowledge of metrics (for data analysis)
- Knowledge of scientific code and language
- Specialisation in the subject at postgraduate level
- Other

On professional practice:

- Not being pressured by immediacy and having the possibility of analysing topics in-depth
- Having a good network of scientist contacts
- Use of programs for discovering audience interests
- Knowledge of strategies for involving audiences in the construction of information (open journalism)
- Working in a credible media outlet/institution
- Being part of a team with prestigious and experienced professionals
- Being clear about the tasks that must be carried out at work
- Knowing that in the media outlet/institution where I work they offer possibilities for specialisation or further training in scientific subjects
- Having the possibility of doing journalism via different techniques: in depth note taking, features, audiovisual interviews, social media tips, photo galleries, etc.
- Other

Of the following sentences, which do you think are those that have been applied or reinforced following the reduction of the lockdown measures due to the pandemic and the return to the workplace? (Select the three main ones)

- The COVID-19 crisis has accelerated digitalisation processes
- Science journalism has undergone an increase in its credibility and importance
- Access to sources and researchers has been easier
- There has been an appearance of more scientific topics and guidelines to communicate to the population
- I have found it necessary to pay more attention to misinformation
- I have incorporated artificial intelligence into my professional task
- The work team has increased, incorporating new members and functions associated with the digital field
- I have confirmed that the tasks can be carried out remotely
- Hybrid working has been imposed
- My workplace changed and there are now new departments and routines
- I have found it necessary to update my skills using programs and social media
- I had to invest to renew technology (mobile and computer)

In your opinion, how prepared do you think Chilean science journalism is for developing fact-checking?

Likert scale:
Very unprepared - not very prepared - moderately prepared - prepared - very prepared

In terms of your own reality, how has misinformation affected your professional practice?

Likert scale:
Completely affected – affected – moderately affected – slightly affected - unaffected

According to your experience, what is the level of credibility of Chilean science journalism?

Likert scale:
Not at all credible - not very credible - moderately credible - credible - very credible

What difficulties do you see in science journalism practice in Chile?

What opportunities do you see in Chilean science journalism following the COVID-19 crisis?

What challenges will Chilean science journalism face following the COVID-19 crisis?

Source: Own creation

The Google Forms platform was used to disseminate the survey and collect responses. The instrument was applied over the course of February and March 2023. As the questions were limited to a specific group of journalists from the area of science and technology, non-probabilistic sampling known as "snowball sampling" was used in order to identify interested parties (Goodman, 1961). In this way, an initial invitation to participate in the survey was given to journalists who work in the field of science and who, at the time the instrument was applied, were members of the Chilean Association of Journalists and Professionals for the Communication of Science (ACHIPEC, 2014), the main association for this type of professional in the country seeking to promote science communication in the territory. The participants were then asked to encourage other science professionals to be part of the study, despite them not being members of the aforementioned association. The survey was likewise sent to other professionals who fulfilled the selection criteria and who were not necessarily association members either, but satisfied the requirements established for their inclusion. Finally, the sample comprised 42 journalists who work in the field under study. All of the respondents gave their explicit consent to the possibility of their answers being used anonymously in this study.

A quantitative and qualitative analysis of the responses was then carried out. Thus, the responses to the questions of a general nature and those on professional practice were processed with the IBM SPSS Statistics software program. In regard to the open questions, the qualitative analysis of the responses obtained was processed via the NVivo program, using the simple text query technique, establishing word coding and clouds grouped via synonyms. This allows generalisations and common points in the respondents to be found (Trigueros-Cervantes, Rivera-García and Rivera-Trigueros 2018). As a way of maintaining the anonymity of the participants in this study, and to favour the processing of the open responses, the En coding was applied, where E refers to the respondent and n is the random number assigned by the researchers (Vernal-Vilicic et al., 2019; Martín-Neira, Trillo-Domínguez and Olvera-Lobo, 2023a).

4. Results

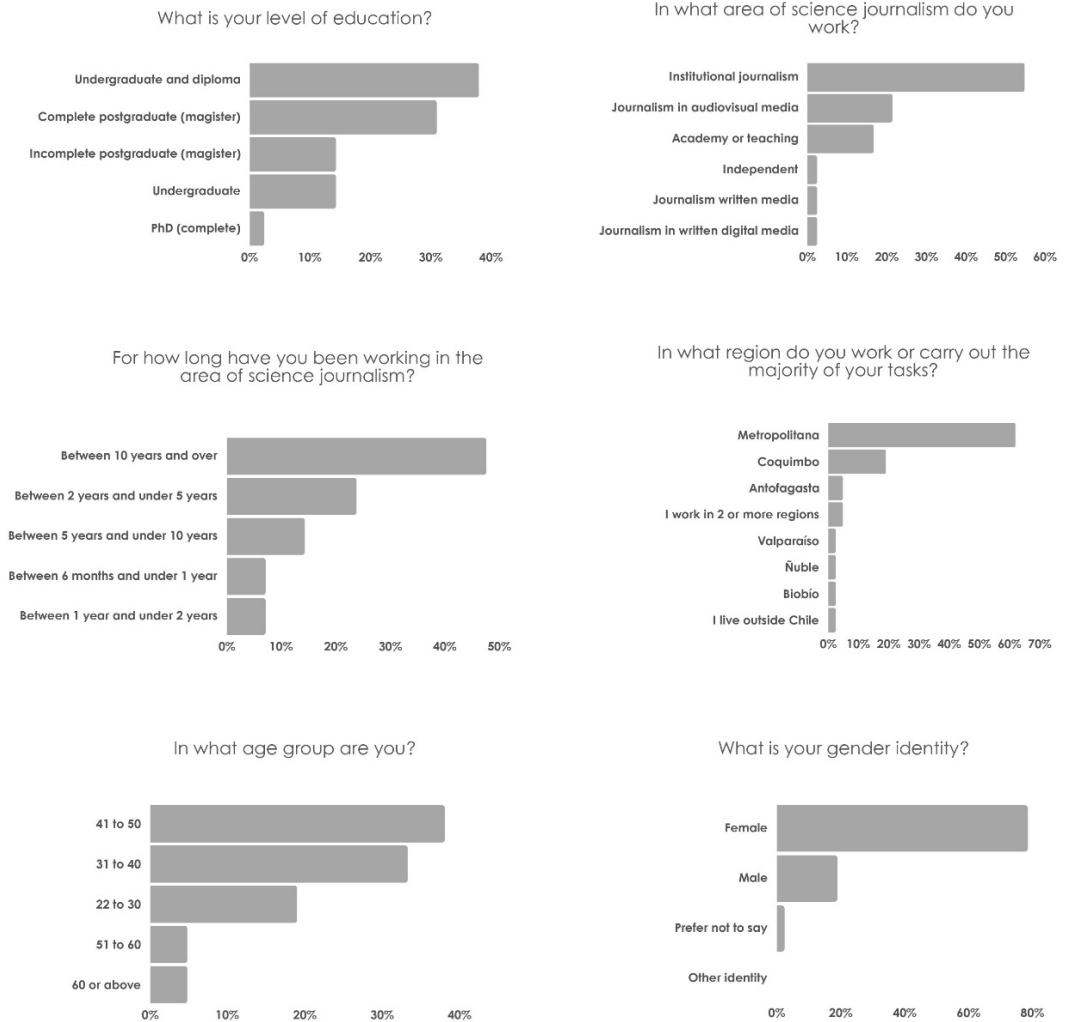
Following the methodological proposal outlined, the results of the study are presented in three different sections 1) characterisation of the study sample, 2) questions on professional work in the digital environment, 3) open reflection questions on the future of the profession.

4.1. Characterisation of the study sample

The year of graduation in journalism or social communication of the 42 participants varies between 1979 and 2022, with 2002 being the most common period. The results of the other questions put forward destined towards the characterisation of the sample are presented in Figure 1. As can be observed, the majority of the respondents have a specialisation, either by obtaining a diploma (38%, 16) or completing a postgraduate degree course (31%, 13). In relation to the area of work in which they carry out their professional activity, the majority of the participants (54.8%, 23) indicate that this takes place in institutions, followed by those who work in television or audiovisual media (21.4%, 9), figures that can be explained by the large number of research and dissemination centres that exist in the country and that require journalism professionals to communicate their activity.

47.6% (20) of the participants have been working in science journalism related activities for over 10 years and 23.8% (10) are in the range between 2 years and under 5 years. The Metropolitana region takes precedence over the other territories of Chile as the zone with the largest volume of workers, standing at 61.9% (26) of the respondents, followed by Coquimbo with 19% (8), data that reinforce the fact that the main institutions, media outlets and universities in the country are concentrated in the Metropolitana. The participants are on the whole in the 41 to 50 age range (38,1%, 16), closely followed by the 31 to 40 category (33,3%, 14). Lastly, it is important to indicate that 78.6% (33) of the sample identifies with the female gender, 19% (8) with the male gender and 2.4% (1) preferred not to say.

Figure 1: Characterisation of the study sample



Source: Own creation

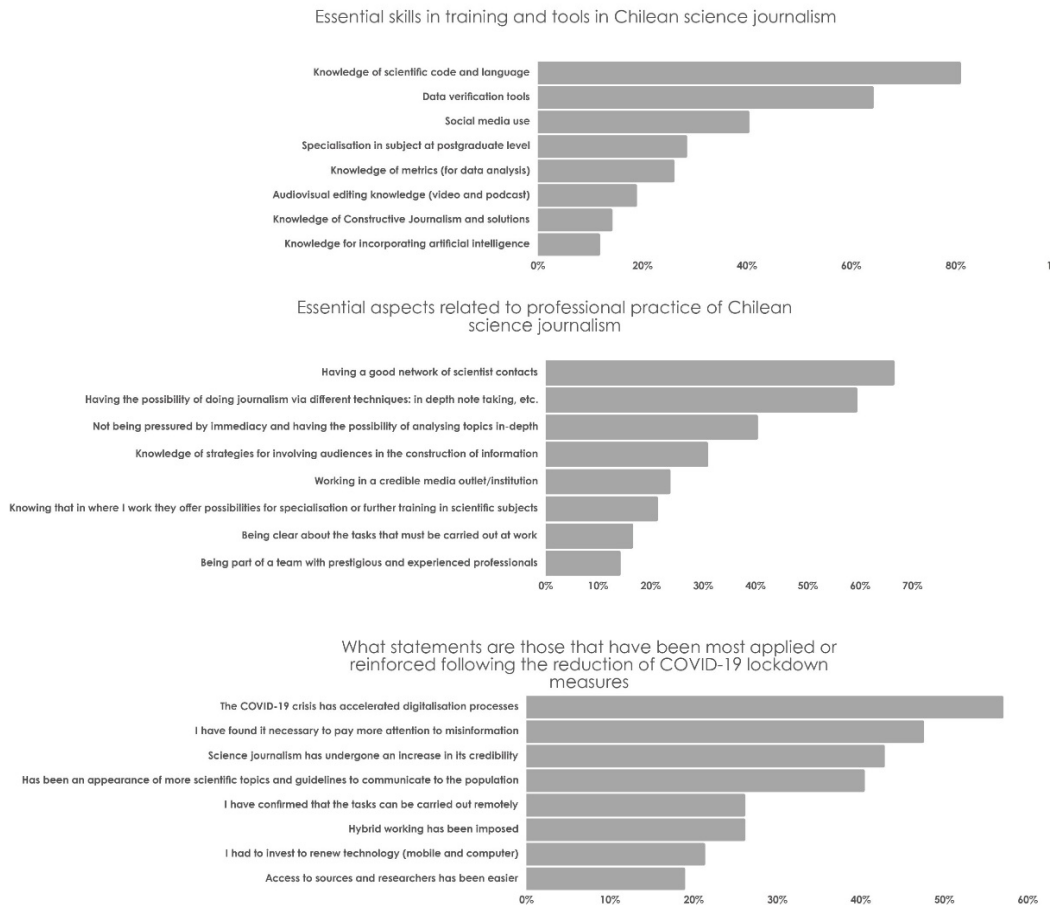
4.2. Opinions on professional activity in the digital environment

In this section, respondents were invited to choose the three options they considered most appropriate in the different statements proposed. In this way, the purpose was to identify their opinions and perceptions regarding their professional work in the digital environment. The results show that communicators currently consider the following aspects to be essential for their training and learning as science journalists: knowledge of scientific code and language (81%, 34), use of data verification applications (64.3%, 27), and appropriate use of social networks (40.5%, 17). When asked specifically about the key aspects for their professional development, the study participants stated that the fundamental elements are related to having a good network of contacts with scientists (66.6%, 28); being able to practice journalism by applying different techniques such as audiovisual notes, written articles and social network management (59.5%, 25); and not being pressured by immediacy to thus be able to work in-depth with the topics covered (40.5%, 17).

In the wake of the situation caused by COVID-19, journalists were asked which aspects have been most implemented or strengthened following the easing of lockdown measures. Against this background, respondents to the questionnaire stated that the health crisis has accelerated digitalisation processes (57.1%, 24), that they have been obliged to pay more attention to misinformation (47.6%, 20), and that they consider science journalism to have experienced an increase in credibility and importance among audiences (42.9%, 18).

Figure 2 presents a summary of the main options chosen by journalists in the different sections and only considers the alternatives that exceed 10% of preferences.

Figure 2: Opinions on professional activity in the digital environment

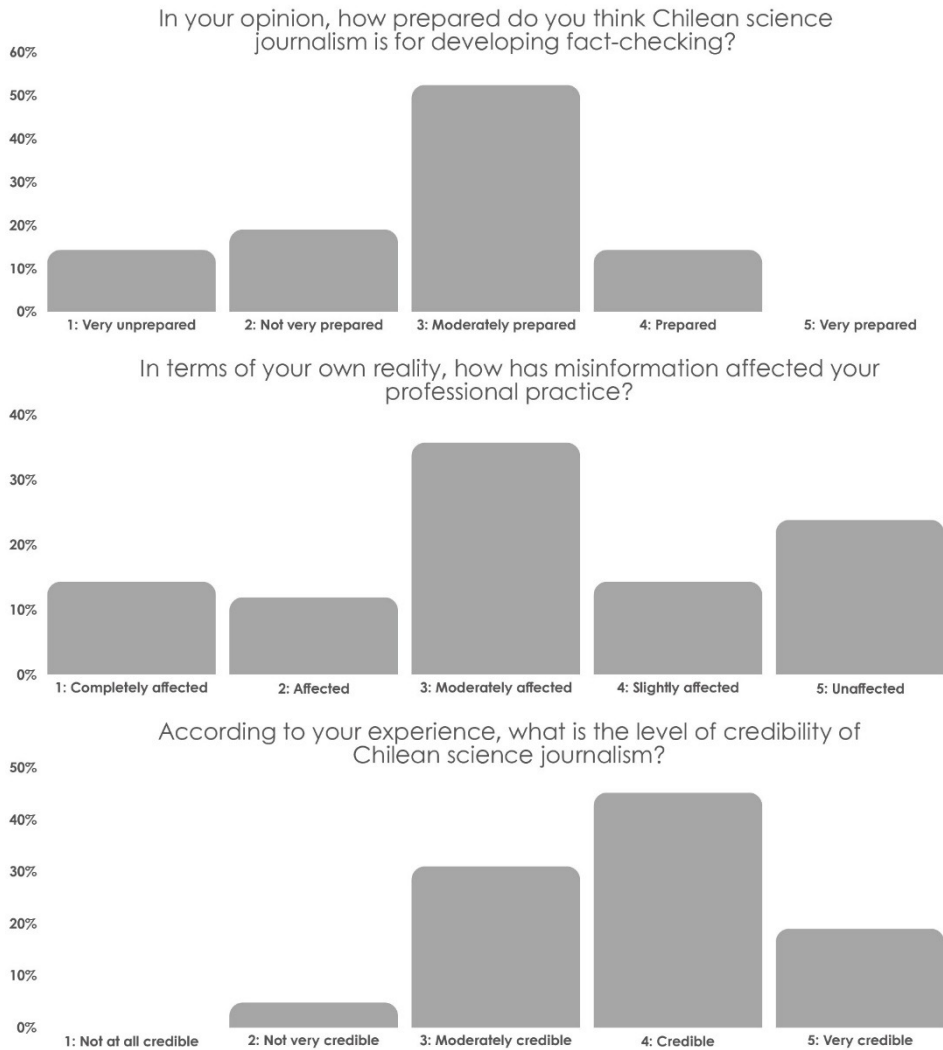


Source: Own creation

On the other hand, journalists were asked to use the so-called summary evaluation method or Likert scale in order to assess several questions related to the way science journalism is developed in Chile, specifically those aspects related to misinformation and the credibility of the profession today (Figure 3). When asked their opinion on whether Chilean science journalism is prepared for the development of fact-checking, the results show that over half of the respondents (52.4%, 22) consider themselves to be moderately prepared, while 33.3% (14) say that professionals in Chile are little or very little prepared to apply fact-checking elements.

On a more personal level, they were asked to what extent they thought that misinformation affected their professional practice. In this regard, 35.7% (15) stated they were moderately affected. However, over 38% (16) of the sample considered their work to have been little or not at all affected as a result of the dissemination of false information. Finally, the respondents were asked about the level of credibility they believed Chilean science journalism had, and the answers reveal a positive view as regards this statement. The 76.2% (32) of the participants said that science journalism in the country is credible or moderately credible. Just 4.8% (2) of those who responded in this study consider it to be not very or not at all credible. Figure 3 details the responses proceeding from this section.

Figure 3: Opinion on Chilean science journalism in the face of misinformation and credibility levels



Source: Own creation

4.3. Reflections on the future of the profession in Chile

The study was also proposed with the aim of opening a space for journalists to be able to reflect on the future of the profession in Chile, and share their opinions about current difficulties, opportunities for development and emerging challenges, especially following the COVID-19 crisis and the increase in actions in the digital environment. In consideration of this, it is important to draw attention to the fact that, on stating their opinions about the difficulties currently faced by the profession, the concepts that arise most frequently when analysing and coding the responses (Figure 4) show how the lack of specialisation and training on the part of professionals, the credibility problems of modern journalism, and the reduced coverage and space afforded by the media to science topics are the concerns that the participants of the questionnaire are most alert to, as some of the selected responses show.

E.21: "There is a lack of specialisation in universities and of a state policy for promoting science".

E.26: "There are few spaces for specialisation and in which it is possible to apply strategies and/or tools that have been successful in order to be able to replicate them. And this is with the objective of reaching the population more closely with scientific content".

E.13: "Media that "frivolize" science, programme formats, such as morning shows, which mix pseudoscience with scientific topics".

E.15: "In general, there is little credibility for the practice of journalism in general and there is still some mistrust of those who do more specialised work".

E.20: "There is a need for more science journalism in the mass and traditional media, as science content tends to be covered in smaller and secondary spaces, or more superficially".

E.30: "Little importance on the part of the media and their editorial lines (programme schedules are not always the best, or space in written media is scarce)".

Figure 4: Difficulties Chilean science journalism faces today



Source: Own creation

In relation to the consultation on existing opportunities in current Chilean journalism, especially in terms of space gained following the coronavirus crisis and the increase of actions in the digital environment, particularly noteworthy (Figure 5) are the concepts associated with the interest that scientific topics currently hold for people, the digitalisation that the media and scientific centres have been obliged to confront, as well as valuing the credibility this field of journalism has for researchers and audiences. A summary of a selection of the answers obtained in this section is shown below.

E.8: "Mass audience interest towards scientific topics was achieved".

E.11: "The confirmation of the social importance of public communication of science, both for the general public and decision-makers".

E.2: "Working in a more digitalised and remote environment, which enables dynamism and flexibility".

E.32: "The opportunity was in the fact that it opened up a path to digitalisation processes that would have taken many more years".

E.15: "Better reception on the part of specialists towards local communicators".

E.19: "The pandemic consolidated the conviction that valid scientific sources in the health field should be present in the media, and considerably increased the network of contacts between journalists and experts".

Figure 5: Development opportunities for Chilean science journalism today



Source: Own creation

Lastly, on being asked about the main challenges facing science journalism in Chile today, 4 topic areas can be determined as the most repeated following the coding and grouping of the journalists' answers (Figure 6). The struggle against misinformation transmitted in the digital environment, keeping audiences interested in scientific content, knowing how to use emerging digital spaces as a communication platform, and the constant specialisation required of journalists, are the variables most pondered by the respondents. The following sentences are part of the reflections expressed by some of the participants.

E.7: "False news is a challenge: How do we tackle it? How do we dismantle it?"

E.18: "Further strengthening the task of science journalism as a fundamental axis for combating misinformation in society".

E.9: "Keeping the community informed with the same frequency as it was kept informed about science topics during the pandemic".

E.37: "People want more, but done with care and common sense. Nobody has time to be bored or miserable in exchange for learning or being informed".

E.33: "Digital spaces should be opened up for science communication".

E.36: "Managing to adapt to the information demands of the new generations without losing sight of the rest, both in regard to the channel and the new formats".

E.4: "Journalists of today should be trained in data science, open data, citizen science and more, to be able to train future generations".

E.25: "Need for specialisation in content and new information technologies".

Figure 6: Challenges for Chilean science journalism today



Source: Own creation

5. Discussion

Technological advances and the digitalisation of functions have undoubtedly changed the way in which journalism is carried out. Ever increasing numbers of media outlets, institutions and universities are taking cyber aspects into account in their work, and they are becoming more important in their communications (Pérez-Seijo, Gutiérrez-Caneda and López-García, 2020; Calvo-Rubio and Ufarte-Ruiz, 2021). In effect, science journalism and those who practice it have not been indifferent to this evolution, and there is a constant effort to create new ways to take advantage of these digital channels for disseminating science content (Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2023a). The study presented here is illustrative for two reasons. Firstly, due to the valuable information it provides from the professional praxis in order to know the importance, visibility and role of science on the media stage from the perspective of the communication being carried out on social networks. Secondly, because of the reflections that collaborate, complementary to the academic analysis, in identifying the challenges and opportunities we face.

From these premises, it is almost a paradox to confirm that the main weakness or challenge of the communication of science on social media is what turns it into its greatest opportunity. We refer to the need for media outlets to recover audience credibility (it is even a survival aim in the press industry) and connect with the new generations, increasingly removed from legacy media. This is at a time that dissemination, explanatory content, and not just that linked to science, has become one of the pillars for attracting audiences. In the battle against misinformation, in the infodemic era announced by the WHO from the COVID-19 crisis, journalists found themselves facing the challenge, but also the opportunity, of reconnecting with the public, recovering the very value of the profession, namely, to be trustworthy, but also to know where the recipients of their stories are and to be able to communicate applying effective styles and narratives. Such ideas are closely linked to another big challenge for the media in the digital and global society of today. Science journalists must therefore endeavour not to lose their role as prescribers and intermediaries, and their essential task of bringing power to account in a democratic communication scenario where actors unconnected to journalism are occupying increasingly prominent spaces.

Along this line, the research questions raised in this work have a bearing on the ideas presented above. In regard to Q.1, which refers to the challenges and opportunities facing science journalism in Chile in the digital and media ecosystem, the respondents highlight the fact that the problem of misinformation (the aforementioned infodemic) is one of the main tasks to be endured. This is not something removed from reality, given that ever more false content is rapidly going viral on the digital platforms (León et al., 2022) and the COVID-19 pandemic was the perfect event for science misinformation to spread on social media (Manioui and Papa, 2023). It is necessary for professionals to be able to manage the codes

of these types of platforms, to be able to act as reference sources in the face of information disorder, and to be capable of remaining alert in the face of the communication challenges emerging from these applications.

Another of the aspects considered as a decisive challenge in the current context is the scarce specialisation that exists in scientific topics, and the need for constant training in digital skills, for example social media. Proof of this is the respondents' statements that the health crisis accelerated digitalisation processes and, thus, they must use emerging cyber spaces as communication platforms. The urgency for specialisation in science knowledge and lack of academic training in the subject is something that had already been observed in previous studies on Chilean science journalism (Valderrama-Zenteno, 2014; Tabja-Salgado, Broitman-Rojas and Camiñas-Hernández, 2017; Vernal-Vilicic et al., 2019), to which today there is still no adequate offering that can meet the requirements of Chilean professionals.

It is important to consider the process of digitalisation, in its entire spectrum, as an alternative and professional challenge. From incorporating a content curator or verifier, to multimedia action creator; specialists in digital marketing and podcast production experts; people linked to the development of technology, artificial intelligence and already mentioned social media manager and communicator (Calvo-Roy and Moreno Castro, 2021; González Alba, 2021).

Moreover, keeping audiences interested in this type of content has also become one of the challenges faced by communicators, especially taking into account all of the current advancements and existing new technologies. The fact that audiences are only moderately interested in science news (Maiden et al., 2020) complicates the possibilities of information reaching the population. This is backed up by the results shown by the latest Survey on Social Perception of Science, Technology, Knowledge and Innovation in Chile (Ministerio de Ciencia de Chile, 2023), according to which 60% of respondents have no access or, where they do, they never or seldom access such scientific information.

In response to research question Q.2, associated with knowing what the usage characteristics are in Chile of social media as a science communication tool, these platforms have positioned themselves as one of the main options for bringing news closer to large audiences (Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2023c), and erected as an important source used by Chileans to consume science and technology news (Ministerio de Ciencia de Chile, 2023) being considered in this study as essential tools for the development of local science journalists. Although social networks are often characterised as being the main channels where misinformation circulates (Costa-Sánchez and López-García, 2020; Montemayor Rodríguez and García Jiménez, 2021), this fact becomes an opportunity for science journalism, and those who do it can position themselves on these platforms with truthful content, in depth, avoiding misinterpretations and fighting against the false information that can be spread thereon (Noain-Sánchez, 2021; Herrero-Diz, Pérez-Escolar and Varona-Aramburu, 2022; Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2023d).

For this reason it is essential that journalists and communicators be able to learn the specific characteristics of these applications, knowing how to use the functional elements that distinguish one from the other, updating their knowledge and being at the vanguard of the content that can be created on them, as well as training themselves in data verification techniques and other actions specific to current media digitalisation processes. This goes hand in hand with the necessary specialisation in digital competencies required of science journalists in the country, to thus make better use of the languages specific to each social network, especially those that consider graphic or audiovisual skills.

Lastly, and as regards Q.3, which reflects on the communicative scenario faced by science, journalism and citizens in Chile, it can be stated that the high credibility enjoyed by the discipline in the country is not an isolated matter. In fact, following the COVID-19 pandemic, there has been a worldwide increase in audience trust in the media channels and journalists who publish on this content (Aleixandre-Benavent, Castelló-Cogollos and Valderrama-Zurián, 2020; European Cooperation in Science and Technology, 2021; García-Avilés et al., 2022). It is thus relevant, given this scenario, for Chilean journalism to be able to be prepared for the development of verifying actions and be a guarantor of reliable information in the digital society (Martin-Neira, Trillo-Domínguez and Olvera-Lobo, 2023d).

Nevertheless, it is important to point out that the discipline still needs to fight against the lack of spaces in traditional media, a situation that is not unconnected to the global reality. As in the case of Chilean journalists, numerous science communication professionals state there is little coverage of this type of content and it is difficult to position science and technology news in newspapers, television and radio (Dunwoody, 2015; Cassany, Cortiñas and Elduque, 2018; Maiden et al., 2020; Harmatij, 2021). The digital context has for this very reason enabled increasing numbers of devices to be found that permit the dissemination of this type of information and thus reach new audiences that are not necessarily frequent consumers of news in traditional media channels, and who normally access it from social networks (Reuters Institute, 2022).

6. Conclusions

This study offers a look at the professional practice of Chilean science journalists, taking into consideration the digital context in which modern society is immersed, its opportunities and challenges. To this end, we consider the analysis and reflections made by the participants in the study to be of enormous value, to the extent that they permit the establishment of elements of limitations, challenges and spaces for improvement, which will be essential for the development of journalism on today's demanding media stage. In this regard, the study enables the identification of specific challenges in various complementary lines of work: in relation to the fight against misinformation and how to confront its spread; in regard to the possibilities of professional specialisation in an ever more interactive, multimedia and multi-platform media scenario, which invites the search for the best paths to keep the attention of audiences and include the different professional digital profiles; and the effective use of the new technologies, especially in relation to social media, which have become one of the main tools for communicating scientific activity.

On putting the spotlight on social media, the study also reveals an increasingly obvious reality for the journalistic profession, which is the need to complete subject specialisation with a greater versatility and knowledge of the new channels used by audiences to obtain their information, along with their new consumption habits. Readers no longer seek media outlets; it is now journalists (and, increasingly, in a personal manner with their own profiles) who reach out to their communities. Such a challenge supposes, from the beginning, a radical change in the way in which social media are being used. They should not be seen merely as a loudspeaker, as windows of opportunity to attract audiences, but as autonomous communication spaces that require specific attention. And it is not only this, for these applications are providing glimpses of coming lines of work, to which special regard must be paid. This is the case of the rapidity and lack of filters for confronting false content being spread via these channels, and in which it is necessary for science journalism to be seen as a defender of the truth. Furthermore, it must be known how to engage the public on social media, managing the particular codes and languages needed for these applications.

The respondents' answers also reveal that the COVID-19 pandemic was an event that has enabled science information to be positioned in a leading role, in contrast to what generally occurs with such content, reduced to minuscule spaces in the media. It is important to be able to take advantage of this boom and develop quality news on topics as important as climate change, the pollution of the oceans, the technological revolutions, the health crises in different parts of the world, and progress in medical matters.

Lastly, and although the number of participants in the survey could be considered a limitation, we believe that the study presented here is a barometer of what prominent communications professionals in Chile think, and the sample size is representative for diverse areas of knowledge, such as the communications media, corporate journalism and the academic world.

This investigation is presented as a constructive approach for profiling the situation in Ibero America as regards the professional practice of science journalism. Future works should focus on considering different geographical areas, journalists of all disciplines and ages, and diverse aspects related to misinformation and digital platform usage, among other aspects, in order to broaden knowledge of the reality faced by the discipline.

7. Specific contribution of each signatory

Contributions	Authors
Study conception and design	1, 2 and 3
Documentary search	1
Data collection	1
Data analysis and critical interpretation	1, 2 and 3
Review and version approval	2 and 3

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10. Declaration on conflicts of interest

The authors declare no conflicts of interest.

11. Additional materials

Both the database and the informed consent model are available as adjoined files. The survey used is included in the article itself.

12. Bibliographical references

- Alexandre-Benavent, R., Castelló-Cogollos, L., & Valderrama-Zurián, J.-C. (2020). Information and communication during the early months of COVID-19: Infodemics, misinformation, and the role of information professionals. *Profesional de la información*, 29(4), 1–17. <https://doi.org/10.3145/epi.2020.jul.08>
- Asociación Chilena de Periodistas y Profesionales para la Comunicación de la Ciencia [ACHIPEC]. (2014). *Estatutos ACHIPEC*. Estatutos. <https://bit.ly/3GOpP0h>
- Bustos Díaz, J., & Ruiz del Olmo, F.-J. (2020). Comunicar en tiempos de crisis en las redes sociales. Estrategias de verificación e intermediación informativa en los casos de Facebook, Instagram y Twitter durante la COVID-19. *Hipertext.net*, 21, 115–125. <https://doi.org/10.31009/hipertext.net.2020.i21.10>
- Cabrera-Méndez, M., Codina, L., & Salaverría, R. (2019). Qué son y qué no son los nuevos medios. 70 visiones de expertos hispanos. *Revista Latina de Comunicación Social*, 74, 1506–1520. <https://doi.org/10.4185/RLCS-2019-1396>
- Calvo-Roy, A., & Moreno Castro, C. (2021). *Periodismo científico en España, una especialidad con pasado, presente y futuro*. Editorial Centro de Estudios Ramón Areces S.A. <https://bit.ly/3zdJkgU>
- Calvo-Rubio, L.-M., & Ufarte-Ruiz, M.-J. (2021). The academic training of iberoamerican journalists to communicate science and its relationship with investment in RyD. *Revista Prisma Social*, 32, 321–343. <https://bit.ly/3AQQ0c6>
- Cassany, R., Cortiñas, S., & Elduque, A. (2018). Communicating science: The profile of science journalists in Spain. *Comunicar*, 26(55), 9–17. <https://doi.org/10.3916/C55-2018-01>
- Costa-Sánchez, C., & López-García, X. (2020). Communication and coronavirus crisis in Spain. First lessons. *Profesional de la información*, 29(3), 1–14. <https://doi.org/10.3145/epi.2020.may.04>
- Diviu-Miñarro, C., & Cortiñas-Rovira, S. (2020). Cómo comunicar una pandemia a la sociedad: la visión de los profesionales. Estudio de caso de la Covid-19 en el sur de Europa. *Profesional de la información*, 29(5), 1–15. <https://doi.org/10.3145/epi.2020.sep.12>
- Dunwoody, S. (2015). Science journalism Prospects in the digital age. In M. Bucchi, & B. Trench (Eds.), *Routledge Handbook of Public Communication of Science and Technology* (pp. 27–39). Routledge. <https://doi.org/10.4324/9780203483794.ch3>
- European Cooperation in Science and Technology. (2021). *Communicating Science in Times of COVID-19: A selective overview of good practices*. <https://bit.ly/3xoQYU7>
- Fürst, S. (2021). "Public communication science in times of the Covid-19 crisis": DACH 21 preconference. *Studies in Communication Sciences*, 1, 189–195. <https://doi.org/10.24434/j.scoms.2021.01.032>
- García-Avilés, J.-A., Arias-Robles, F., de Lara-González, A., Carvajal, M., Valero-Pastor, J. M., & Mondéjar, D. (2022). How COVID-19 is Revamping Journalism: Newsroom Practices and Innovations in a Crisis Context. *Journalism Practice*, 1–19. <https://doi.org/10.1080/17512786.2022.2139744>
- García-Alcaraz, F., Alfaro-Espín, A., Hernández-Martínez, A., & Molina Alarcón, M. (2006). Diseño de Cuestionarios para la recogida de información: metodología y limitaciones. *Revista Clínica de Medicina de Familia*, 1(5), 232–236. <https://bit.ly/3jic7LF>

- González Alba, J. A. (2021). La adaptación de los profesionales a la transformación digital de los medios: los nuevos perfiles que se incorporan a las redacciones. *Cuadernos de Periodistas*, 43, 47–55. <https://bit.ly/48T9AMM>
- González-Pedraz, C., & Campos-Domínguez, E. (2017). Science journalist professional practice: bibliographical review of the dysfunctions derived from the digital environment. *Revista Mediterránea de Comunicación*, 8(2), 225–240. <https://doi.org/10.14198/medcom2017.8.2.14>
- Goodman, L.-A. (1961). Snowball Sampling. *The Annals of Mathematical Statistics*, 32(1), 148–170. <https://doi.org/10.1214/aoms/1177705148>
- Grassau, D., Porath, W., & Ortega, C. (2021). *La crisis de la industria de los medios y la precarización del empleo del periodista*. Facultad de Comunicaciones, Universidad Católica de Chile. <https://bit.ly/3TXv1DU>
- Greene-González, M.-F., Cerda-Diez, M.-F., & Ortiz-Leiva, G. (2022). Journalistic practices in times of the coronavirus pandemic. A comparative study between Chile and Colombia. *Revista de Comunicación*, 21(1), 195–213. <https://doi.org/10.26441/rc21.1-2022-a10>
- Hansen, A. (2016). The changing uses of accuracy in science communication. *Public Understanding of Science*, 25(7), 760–774. <https://doi.org/10.1177/0963662516636303>
- Harmatij, O. (2021). Science Coverage: What Does the Audience Want and Really Need? Exploring Media Consumption in Ukraine. *Journal of Creative Communications*, 16(1), 97–112. <https://doi.org/10.1177/0973258620981799>
- Hernández, M.-V., & Roldan, J. M. (2022). *Recolección y análisis de datos con formularios de Google*. Universidad Nacional de la Pampa. <https://bit.ly/3kq8DGT>
- Herrero-Diz, P., Pérez-Escolar, M., & Varona-Aramburu, D. (2022). Fact-checking skills: a proposal for Communication studies. *Revista de Comunicación*, 21(1), 231–249. <https://doi.org/10.26441/rc21.1-2022-a12>
- Jarreau, P., & Porter, L. (2018). Science in the Social Media Age: Profiles of Science Blog Readers. *Journalism and Mass Communication Quarterly*, 95(1), 142–168. <https://doi.org/10.1177/1077699016685558>
- Kemp, S. (2023). *Digital 2023: Chile — DataReportal – Global Digital Insights*. Digital 2023: Chile. <https://bit.ly/3ZmHpAn>
- Kristiansen, S., Schäfer, M. S., & Lorencez, S. (2016). Science journalists in Switzerland: Results from a survey on professional goals, working conditions, and current changes. *Studies in Communication Sciences*, 16(2), 132–140. <https://doi.org/10.1016/j.scoms.2016.10.004>
- León, B., López-Goñi, I., & Salaverría, R. (2022). The Covid-19 catastrophe : A science communication mess? *Church, Communication and Culture*, 7(1), 6–22. <https://doi.org/10.1080/23753234.2022.2031236>
- León, B., Martínez-Costa, M.-P., Salaverría, R., & López-Goñi, I. (2022). Health and science-related disinformation on COVID-19: A content analysis of hoaxes identified by fact-checkers in Spain. *Plus One*, 17(4), 3–18. <https://doi.org/10.1371/journal.pone.0265995>
- López-Rico, C.-M., González-Esteban, J.-L., & Hernández-Martínez, A. (2020). Information consumption in social networks during the Covid-19's crisis in Spain. *Revista de Comunicación y Salud*, 10, 461–481. [https://doi.org/10.35669/rcys.2020.10\(2\).461-481](https://doi.org/10.35669/rcys.2020.10(2).461-481)
- Maiden, N., Zachos, K., Franks, S., Wells, R., & Stallard, S. (2020). Designing Digital Content to Support Science Journalism. In *NordiCHI '20: Proceedings of the 11th Nordic Conference on Human-Computer Interaction: Shaping Experiences, Shaping Society* (pp. 1–13). <https://doi.org/10.1145/3419249.3420124>
- Maniou, T.-A., & Papa, V. (2023). The dissemination of science news in social media platforms during the COVID-19 crisis: Characteristics and selection criteria. *Communication and Society*, 36(1), 35–46. <https://doi.org/10.15581/003.36.1.35-46>
- Marta-Lazo, C., Rodríguez-Rodríguez, J.-M., & Peñalva, S. (2020). Digital journalism competences. Systematic review of the scientific literature on new professional profiles of the journalist. *Revista Latina de Comunicación Social*, 75, 53–68. <https://doi.org/10.4185/RLCS-2020-1416>

- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2022a). La divulgación científica en Instagram: usos y estrategias desde la praxis chilena. *Cuadernos.info*, 53, 229–252. <https://doi.org/10.7764/cdi.53.42515>
- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2022b). The dissemination of scientific news in the Chilean press: Analysis of digital and printed publications on coronavirus. En M. Álvarez-Chávez, G. Rodríguez-Garay, & S. Husted (Eds.), *Communication and plurality in a divergent context* (pp. 800–829). Dykinson. <https://bit.ly/3OEVQtl>
- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2023a). Comunicación científica tras la crisis del COVID-19: estrategias de publicación en TikTok en el tablero transmedia. *Revista Latina de Comunicación Social*, 81, 109–132. <https://doi.org/10.4185/RLCS-2023-1841>
- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2023b). From TV to TikTok: New audiovisual formats to communicate about science. *Comunicación y Sociedad*, 1–27. <https://doi.org/10.32870/cys.v2023.8441>
- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2023c). Las redes sociales como vehículo del periodismo científico: 'Scoping Review'. *Index.comunicación*, 13(1), 105–127. <https://doi.org/10.33732/ixc/13/01lasred>
- Martin-Neira, J.-I., Trillo-Domínguez, M., & Olvera-Lobo, M.-D. (2023d). Science journalism against disinformation: decalogue of good practices in the digital and transmedia environment. *ICONO 14. Revista Científica De Comunicación y Tecnologías Emergentes*, 21(1), 1–19. <https://doi.org/10.7195/ri14.v21i1.1949>
- Martínez-Sanz, R., & Arribas-Urrutia, A. (2021). The role of social networks for future journalists. Management, use and behavior of students and university professors of Ecuador. *Cuadernos.info*, 49, 146–165. <https://doi.org/10.7764/cdi.49.27869>
- Massarani, L., Entradas, M., Fernandes-Neves, L.-F., & Bauer, M. (2021a). *Global Science Journalism Report 2021. Working conditions and practices, professional ethos and future expectations*. SciDev. <https://bit.ly/43nDJAe>
- Massarani, L., Fernandes-Neves, L.-F., Entradas, M., Lougheed, T., & Bauer, M.-W. (2021b). Perceptions of the impact of the COVID-19 pandemic on the work of science journalists: global perspectives. *JCOM*, 20(7), 1–22. <https://doi.org/10.22323/2.20070206>
- Massarani, L., Fernandes-Neves, L.-F., Lougheed, T., & Bustamante-Hernández, N. (2022). *Science Journalism in Latin America and the Caribbean 2022: the perspective of science journalists*. The Kavli Foundation, the World Federation of Science Journalists, & the Brazil's National Institute of Public Communication of Science and Technology. <https://bit.ly/42rZU7D>
- Massarani, L., & Oliveira, T. (2022). Research in science communication in Latin America: mind the gap. *JCOM*, 21(7), 1–8. <https://doi.org/10.22323/2.21070308>
- Matas, A. (2018). Likert-Type Scale Format Design: State of Art. *Revista Electrónica de Investigación Educativa*, 20(1), 38–47. <https://bit.ly/3bmsu5J>
- Mayo-Cubero, M. (2022). A multivariate analysis on news production in Spain: digital newsroom profile, polyvalent journalists and gender perspective. *Communication and Society*, 35(3), 1–14. <https://doi.org/10.15581/003.35.3.1-14>
- Mellado, C. (2022). Roles e identidades digitales en Twitter e Instagram. Un estudio etnográfico de periodistas chilenos. *Profesional de la información*, 31(4), 1–18. <https://doi.org/10.3145/epi.2022.jul.14>
- Mellado, C., Cárcamo-Ulloa, L., Alfaro, A., Inai, D., & Isbej, J. (2021). Fuentes informativas en tiempos de Covid-19: Cómo los medios en Chile narraron la pandemia a través de sus redes sociales. *Profesional de la información*, 30(4), 1–15. <https://doi.org/10.3145/epi.2021.jul.21>
- Mila-Maldonado, J.-A., y Soengas-Pérez, X. (2021). El papel de la prensa chilena en contextos de emergencia sanitaria. Tratamiento informativo del COVID-19 en el diario digital El Mercurio. *Cuadernos del Centro de Estudios de Diseño y Comunicación*, 136, 153–165. <https://doi.org/10.18682/cdc.vi136.5045>
- Ministerio de Ciencia. (2023). *III Encuesta Nacional de Percepción Social de Ciencia, Tecnología, Conocimiento e Innovación (CTCI)*. Ministerio de Ciencia, Tecnología, Conocimiento e Innovación de Chile. <https://bit.ly/3qq1dqh>

- Molina-Cañabate, J.-P., & Magallón-Rosa, R. (2020). Misinformation and scientific journalism. The case of Maldita Ciencia. *Revista Mediterránea de Comunicación*, 11, 11–20. <https://doi.org/10.14198/MEDCOM2020.11.2.4>
- Montemayor Rodríguez, N., & García Jiménez, A. (2021). Perception of journalists about disinformation and professional routines in the digital age. *Revista General de Información y Documentación*, 31(2), 601–619. <https://doi.org/10.5209/rgid.79460>
- Noain-Sánchez, A. (2021). Disinformation and Covid-19: Quantitative analysis through the hoaxes debunked in Latin America and Spain. *Estudios Sobre el Mensaje Periodístico*, 27(3), 879–892. <https://doi.org/10.5209/ESMP.72874>
- Parodi, G., & Ferrari, S. (2007). El discurso de la ciencia y la tecnología en la Prensa Escrita Chilena: Aproximación al Corpus DICIPE-2004. *D.E.L.T.A.*, 23(2), 339–369. <https://doi.org/10.1590/S0102-44502007000200007>
- Pérez-Sejjo, S., Gutiérrez-Caneda, B., & López-García, X. (2020). Periodismo digital y alta tecnología: de la consolidación a los renovados desafíos. *Index.comunicación*, 10(3), 129–151. <https://doi.org/10.33732/ixc/10/03period>
- Reuters Institute. (2022). *Digital News Report 2022*. <https://bit.ly/3RWFqPM>
- Reyes-de-Cózar, S., Pérez-Escolar, M., & Navazo-Ostúa, P. (2022). Digital Competencies for New Journalistic Work in Media Outlets: A Systematic Review. *Media and Communication*, 10(1), 27–42. <https://doi.org/10.17645/mac.v10i1.4439>
- Romero-Luis, J., Carbonell-Alcocer, A., & Gértudix Barrio, M. (2020). Interactive multimedia video article, an innovative format for scientific communication. *Así*, 18, 90–110. <https://bit.ly/3J8QI3D>
- Sánchez-Gonzales, H. M. (2022). *La digitalización en el periodismo, Transformación, retos y oportunidades (1a ed.)*. Gedisa.
- Sanz-Hernando, C., & Parejo-Cuéllar, M. (2021). Disruption in the communicative model of expert sources: the impact of COVID-19 on both cultural- scientific and innovation units. *Revista de Comunicación de la SEECI*, 54, 163–186. <https://doi.org/10.15198/seeci.2021.54.e697>
- Schultz, T. (2023). A Survey of U.S Science Journalists' Knowledge and Opinions of Open Access Research. *International Journal of Communication*, 17, 2732–2753. <https://bit.ly/3mAdFCk>
- Sixto García, J., Vázquez-Herrero, J., & López-García, X. (2022). Journalists' Self-Perception of Their Profession in Spain: Analysis of Social and Technological Challenges. *Tripodos*, 52, 111–128. <https://doi.org/10.51698/tripodos.2022.52p111-128>
- Smith, H., & Morgoch, M. L. (2020). Science y Journalism: Bridging the Gaps Through Specialty Training. *Journalism Practice*, 1–18. <https://doi.org/10.1080/17512786.2020.1818608>
- Tabja-Salgado, J., Broitman-Rojas, C., & Camiñas-Hernández, A. (2017). Percepción de los científicos y periodistas sobre la divulgación de la ciencia y la tecnología en Chile. *Revista Latina de Comunicación Social*, 72, 1107–1130. <https://doi.org/10.4185/RLCS-2017-1210>
- Trigueros-Cervantes, C., Rivera-García, E., & Rivera-Trigueros, I. (2018). *Técnicas conversacionales y narrativas: Investigación cualitativa con Software NVivo*. Escuela Andaluza de Salud Pública/ Universidad de Granada. <https://bit.ly/3y4O0oh>
- Valderrama-Zenteno, L. (2014). Comunicar la ciencia en Chile: problemas formativos del periodismo y la divulgación científica actual. En R. Torres (Ed.), *Ciencia y Sociedad en el siglo XXI Estrechando vínculos desde una mirada Franco-Latinoamericana* (pp. 35–49). <https://doi.org/10.13140/2.1.4262.2407>
- Vernal-Vilicic, T., & Valderrama-Zenteno, L. (2022). Comunicación pública de la ciencia y la tecnología en Iberoamérica. *Cuadernos.info*, 52, 1–3. <https://doi.org/10.7764/cdi.52.50593>
- Vernal-Vilicic, T., Valderrama-Zenteno, L., Contreras-Ovalle, J., & Arriola, T. (2019). Perception of training and specialization of scientific journalism in Chile. *Cuadernos.info*, 45, 213–226. <https://doi.org/10.7764/cdi.45.1717>