Article

Information Disorders in the Chilean and Spanish Press: A Comparison Using Thematic Modelling

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Abstract: This article focuses on the role of information disorders in media coverage of cancer as a growing public health problem on both sides of the Atlantic. Taking the examples of Chile and Spain, we analysed news ($n = 5522$) published by major digital newspaper outlets in both countries between 2020 and 2022 to explore the elements of contextual information disorders, the over- and/or under-representation of mentions of sources and actors, and major latent topics in both journalistic systems. To achieve these objectives, we employed topic modelling and coherence techniques. The results revealed a high number of references to institutional, administrative, and political sources and actors, followed by mentions of issuers of strategic communication and, less frequently, patients' associations. The discourses differed in their underlying topics, with risk factors and psycho-social factors being the most frequently addressed in the Spanish press and geo-political and institutional health contexts being the most frequently mentioned in the Chilean press. The topic of advances in research, however, was common in both journalistic systems. This article closes by identifying future challenges in health communication.

Keywords: health communication; cancer; media coverage; contextual misinformation; latent topic

1. Introduction

At the beginning of a new stage marked by the irruption and impact of artificial intelligence technologies, some media companies are continuing their journey towards digitisation, highlighting concerns about the implementation of automated content and its influence on public trust records (Newman 2023).

After reviewing some exploratory studies, Peña-Fernández et al. (2023) pointed out that, in the case of subjective texts created in an automated way, both the trust and credibility attributed to them suffer, compared to those written by journalists. Media may have to add this to the crisis of trust they are facing in an environment that can be called the post-truth era and the post-factual world, due to the consolidation of disinformation as a global phenomenon (Lewandowsky et al. 2017). Pérez-Curiel and Casero-Ripollé (2022) propose the need for journalism to exercise its role as a leader against disinformation to guarantee its future, "implementing effective verification processes and strategies and reinforcing its social position, its legitimacy and credibility in the eyes of citizens" (p. 94).

At the same time, new challenges and roles arise for journalists because

"the eventual relief that the application of generative AI would bring to the creation of content of little added value or repetitive nature can put the focus back on more qualitative –and also more intrinsically human– aspects, such as the search for information, the interpretation of facts, creativity, humour or criticism, i.e., issues that can contribute to improving their work". (Peña-Fernández et al. 2023, p. 8)

Thus arises the vindication of journalism as a public service actor, given that news content is essential to ensure democracy, development, science, health, and human progress (Ireton and Posetti 2020). This article focuses on one of these areas for which journalism is key—that of health—adding to the works of other health communication actors, which ultimately aims to "move towards an informed and empowered individual who can make smart choices for themselves, their families and communities whether in everyday life, business and/or public policy" (Ratzan 2017, p. 193). More specifically, it focuses on examining the communicative practices of the digital press in the case of cancer, one of the diseases of major international concern. Cancer is a worldwide public health problem that can affect anyone in the population (Corbacho-Valencia et al. 2018) and spreads among different social groups across the globe (AZERTAC 2023). In 2020, cancer was the leading cause of death globally (WHO 2022) and responsible for approximately 9.9 million deaths worldwide (SEOM 2023). In the same year, new cases of cancer exceeded 19 million (International Agency for Research on Cancer 2021), and the incidence of the disease was projected to reach 29 million cases by 2040 (Wild et al. 2020).

The countries of Chile and Spain have been selected for this research due to the similarity of their health systems. In 2018, when the latest available data were released, Chilean healthcare was already the most efficient in Latin America (Izquierdo et al. 2018) and on par with Spain's that same year, which ranks as the most efficient in Europe and the third most efficient in the world (Miller and Lu 2018). Despite subsequent declines in the ranking of both nations, the Chilean and Spanish systems remain regional benchmarks and demonstrate strong similarities and degrees of evolution.

According to Núñez-Gómez et al. (2020), media attention and coverage of a problem in the communicative processes within the field of health become more relevant when the problem involves health risks. These researchers have argued that media focus is a priority for correctly informing the public, preventing panic in the public, and encouraging preventive measures provided by health authorities. It has been also empirically demonstrated that the information provided by media outlets significantly conditions the development of the public's perception of risks (Rubio Ferreres 2009) and is indispensable to ensuring the compliance of citizens with measures for health promotion, disease prevention, and disease containment (Stanojlovic 2015; Sotelo Rodríguez 2020), with the press being "one of the most important instruments in the development of a health crisis posed in peaceful terms" (Semir et al. 2004, p. 124).

However, according to Sádaba and Salaverría (2023), given such high exposure to the impact of information, disinformation has emerged as a major problem for democratic societies today. Southwell et al. (2017) point out that the medical field is frequently confronted with the dissemination of false, inaccurate, or inconsistent health information. Information on cancer has always been contaminated by sources that try to promote miracle products and non-scientific therapies for its prevention or cure (Revuelta et al. 2012), while in the conventional media, "journalistic work has acted as a filter, reducing the possibilities for these sources to have a voice in society, with the spread of the internet this information not only circulates freely, but in certain formats (especially social media), it occupies a predominant place, sometimes much higher than information based on scientific evidence" (Revuelta et al. 2012, p. 69). "The rise of social media and their preponderance in the reconfiguration of public information spaces has led to citizens being overexposed to disinformation" (Puebla-Martínez et al. 2021, p. 3). In addition to this, there is also corporate disinformation in the field of health from various corporate organisations, for example, sometimes branded pharmaceuticals (Del-Fresno-García 2019).

In any case, it is worth remembering that disinformation does not necessarily come from social media, marketing, or fundamentalism; the scientific community and media outlets are also sources of disinformation for the population (Robles 2021), although most of the disinformation content reaches citizens through non-journalistic channels (Salaverría 2021). As Robles (2021) states, the danger lies in the public's high confidence in news about medical and/or scientific innovations: "if a health news story claims to be based on a

scientific study, it almost immediately acquires the quality of 'truth' for public opinion" (p. 14). Several studies have reported the significant effects of disinformation on the prevention-oriented behaviours of the recipients of misleading messages (Espinoza and Mazuelos 2020; Porroche 2017). In this complex situation, the Spanish platform for investigating media hoaxes and disinformation disseminated through social media, Verifica RTVE (2023), has observed 27 false, hoax, exaggerated, unproven, misleading, or inaccurate health information reports from Spanish mass media circulating on social media since 2021.

To counteract these tendencies, professionals and media outlets have established and abide by ethical frameworks. For their part, public institutions and administrations also maintain specialised commissions, including the Advisory Commission Against Disinformation, the first report of which was published on 28 August 2023 (Anguita et al. 2023). Several studies in the Chilean context in the past five years have also revealed high levels of exposure to false information, high levels of its perceived credibility, and a high propensity to share information that is ultimately false (e.g., Grassau et al. 2019, 2020; Valenzuela et al. 2019).

In recent years, fact-checking platforms have become a mainstay around the world. Although the activity of Verifica RTVE in Spain is one example, the reality of fact checking in Spain remains in its infancy (López and Rodríguez 2020). Moreover, in Chile, despite pioneering journalistic initiatives, including *El Polígrafo* of *El Mercurio*, the country has few spaces dedicated to such platforms (Anguita et al. 2023).

As Sánchez Duarte and Magallón-Rosa (2023) have announced, the concept of disinformation has a multidimensional character, and its massive use has prevented a unitary and consensual definition of the term. The definition probably most widely agreed upon in the scientific community relates to the "intentional dissemination of non-rigorous information that seeks to undermine public confidence, distort facts, convey a certain way of perceiving reality and exploit vulnerabilities with the aim of destabilising" (Olmo 2019). This is a definition that fits perfectly with the common meaning of the term "disinformation" in the English-speaking world (see Oxford English Dictionary or Merriam-Webster Dictionary) but not so much with the Spanish-speaking world, where the meaning of the term includes "lack of information, ignorance" (DRAE 2014), without pointing out its deliberate and intentional dissemination.

At the same time, in the context of health communication, it is worth noting the widespread dissemination of unintentionally false content, as observed on social media during the COVID-19 pandemic, and that "although some of this information is spread without malice, the language, sentiments and tactics are similar to those observed in anti-vaccination advocates (e.g., emotionally charged false narratives about the side effects of vaccines)" (Ratzan et al. 2020, p. 2).

The above prompts us to broaden our focus, and in addition to examining the concept of disinformation—false information knowingly shared to cause harm—we also consider the concept of misinformation, defined in the conceptual framework of information disorders as being "when false information is shared, but no harm is meant" (Wardle and Derakhshan 2017, p. 5). In a recent review of the health-related literature defining misinformation, out of the twenty definitions found, fifteen mentioned "false/inaccurate/incorrect" and seven characterised misinformation as "unintentional" versus five that noted it as "intentional" (El Mikati et al. 2023). Wardle and Derakhshan (2017) explicitly reference, as an example of this concept, "medical misinformation", which "has always posed a worldwide threat to health, and research has demonstrated how incorrect treatment advice is perpetuated through spoken rumours, tweets, Google results and Pinterest boards" (p. 10).

For example, Waszak et al. (2018) found unintentional misinformation or misinformation in 40% of news stories analysed between 2012 and 2017, with these posts being shared more than 450,000 times.

Even for some health science specialists, the concept of disinformation is seen more broadly, understanding disinformation as the provision of misinformation "through alarmist or morbid headlines, confusing scientific information, stereotypes, invisibility of some pa-

tient groups, poor social context, inappropriate use, abuse or frivolizasion of terms and scarce preventive information" (Porroche 2017, p. 250). Thus, in health, for this author, disinformation comprises not only the issuing of inaccurate information but also the omission of valid and relevant information (Porroche 2017).

Regarding the use of alarmist or morbid headlines, which clearly refers to sensationalism and the use of vague and sensationalist language that should be avoided in health communication (AHCJ n.d.), as a practice that distances from the reality addressed, sometimes, these may be driven by clickbait strategies, again entering the realm of informative disorders in terms of inaccurate information due to false connections or little coincidence with the content of the article (Wardle and Derakhshan 2017).

Semir et al. (2009) point out the existence of two patterns in journalistic coverage of health issues: an acute one, which is quick, not very specialised, and of great media impact, and a chronic one, which is more specialised and elaborated but of less impact and, therefore, less present on the media agenda and, consequently, the social agenda. "Paradoxically, these acute pattern topics, which so clearly influence the social agenda, can hardly contain information that is as contrasted, detailed or contextualised as that corresponding to those that follow a chronic pattern" (Semir et al. 2009, p. 110). This reinforces the idea of the need to report on preventive measures or healthy habits, to add context, and to report on an ongoing basis (AECC 2006).

At the same time, health news in Spain is governed by the same news values as other topics on the journalistic agenda, such as spectacularity, negativity, controversy, novelty, etc., although the treatment of some diseases, such as cancer, adds greater depth to the information and type of sources (Semir et al. 2001).

Since 2004, there has been an increase in information that does not depend on a high impact or an extraordinary news event (topics of sudden interest, with an acute pattern) but rather on constant interest (a chronic pattern), such as cancer (Semir et al. 2005). The 2011 Quiral Report focused monographically on information in the media and social media regarding cancer and the associated information needs, revealing that, in Spain, certain types of tumours concentrate journalistic attention more than others (breast cancer is the most present in the media), with a certain—but not total—similarity in the alignment with the seriousness and prevalence among the population, and highlighting the fact that

> "the media are not an "accurate reflection of reality" but a reflection of a part of it, a part selected according to journalistic criteria and according to the influence that the different sources, production systems and the business environment in which they are produced may have". (Revuelta et al. 2012, p. 68)

The Spanish Association Against Cancer (Asociación Española Contra el Cáncer) points out what it considers to be bad communication practices with regard to cancer-related information that lead to a distancing from the realities of the issues addressed. These practices include, among others, the use of alarmist or morbid headlines as well as their inappropriate use; the abuse or frivolisation of terms (in both cases, sometimes falling into sensationalism and paternalism); confusing scientific information; the invisibility of some groups of patients; the lack of context in health information; and little preventive information (AECC 2006, pp. 9–10). At the same time, they advocate for the need to "treat health information with greater rigour, depth, effectiveness and respect" (AECC 2006, p. 12). This involves promoting social awareness of the disease, avoiding sensationalism, including patients' associations among the sources, and continuously monitoring and treating information.

Despite the extent of cancer disease, not many studies have focused on cancer information disorders. For example, research on cancer-related misinformation only accounts for around 4.6% of the total number of studies which investigated misinformation susceptibility in health-related problems (Nan et al. 2022). Recent studies in the Spanish-speaking world that have analysed the media coverage of cancer have not focused on the development of communicative practices related to information disorders (e.g., Carrasco García et al. 2021). Additionally, cancer misinformation poses potential for causing high harm, even, ultimately,

leading to increased mortality risks (Swire-Thompson and Johnson 2024). Thus, there is a particular need for studies on media information disorders—in the broader sense outlined above—in the context of cancer, especially from a comparative perspective.

Considering all the above, the main objective of this study is to explore whether there are elements of information disorders, in the broad sense outlined, in the coverage of cancer in major digital versions of newspapers with the largest weekly reach in Spain and Chile. The digital press has been selected because, according to Negredo (2023), 51% of Spanish adults opt for reading via the Internet as a way of obtaining information, and digital newspapers continue to rank third among the various types of news sources in the Digital News Report (Amoedo et al. 2023) ranking (between 7 and 15%). In Chile, 36% of respondents say they use online sources—except social media—for news consumption. In terms of weekly reach, digital versions of the newspapers rank second (8–21%) only to television channels (Fernández and Núñez-Mussa 2023).

The reality on the ground will be broken down, and some brief recommendations will be proposed for journalists dealing with information disorders. Based on this main objective, other specific objectives are proposed. The first specific objective of this study is to analyse the information published in both Chile and Spain with an eye for possible elements of sensationalism, emotional content, exaggeration, expressions of opinion, clickbait, the presence or absence of contextual information and information about primary prevention (i.e., disease prevention), health promotion, and protection actions (SEOM 2017), as well as visibility for the groups involved.

The second specific objective of this study concerns the types of sources most used, as well as the presence of so-called strategic communication issuers, including specialised organisations such as hospitals and clinics, associations, foundations, academies, and research centres. It has long been shown that these specialised issuers engage in extensive communication activity on social media during campaign periods (Fernández-Gómez and Díaz-Campo 2016). However, the relevance of their role fuels the question of whether media coverage occurs during all periods, with or without a campaign. Assis (2023) suggests that communication is "hegemonically operated under the aegis of transmission and the urgency of media campaigns and pressures, with limited human and technological resources" (p. 2) and that health communication practices for the prevention and early detection of cancer tend to repeat themselves instead of seeking new models.

Another extensively studied aspect of current health information coverage is the treatment of information. This aspect has usually been measured using lexicons employed by professionals on topics such as mental illness (Belghanou Tarhouli 2022; Matus Lobos 2023), obesity (Camacho Markina et al. 2023), COVID-19 (Mila-Maldonado and Soengas-Pérez 2021; Parejo Cuéllar and Martín-Pena 2020), and HIV (Mora Bello 2022). Regarding cancer, the presence of studies at the national level in Chile (Carrasco García et al. 2021) and of certain specific audiovisual programmes in Spain (e.g., *TVE Saber Vivir*, García Salguero 2018) has been highlighted but never examined in a holistic comparative study of the two countries.

To fill these gaps in the research and achieve the objectives of this study, we have formulated the following research questions:

RQ1: *Are there elements of information disorders—in the broadest sense of the term—in the coverage of cancer in the Chilean and Spanish digital newspapers?*
RQ2: *Do digital newspapers in Chile and Spain rely on specialised sources and actors, including healthcare or strategic communication broadcasters?*
RQ3: *Do differences exist between Chile and Spain in lexical information processing regarding the treatment of cancer?*

2. Method

2.1. Data Collection

The data for this study were extracted using the tool *Sophia2*, created as part of a project to develop and validate methods and computational indicators for measuring media pluralism (Vernier et al. 2023).

Strategic queries and Boolean phrases (i.e., with the "OR" operator) were used to filter specific information in health communication about cancer in major Chilean and Spanish newspapers. Keywords included the nouns "cancer", "oncology", "leukaemia", "lymphoma", "neoplasia", or "tumour", as well as the adjective "oncological", with all variants and without accents (considering the diacritical marks in these Spanish-language words).

Two corpora of general news were created to perform a comparative study between the countries, both representative of a 3-year publication period (from 1 January 2020 to 31 December 2022). The first was composed of 3506 news items from Spain, while the second included 2016 news items from Chile. In the case of Spain, news items were taken from *El País*, *El Mundo*, *El Español*, and *El Diario.es*, while in Chile, news items came from *La Tercera*, *El Mercurio*, *El Mostrador*, and *El Ciudadano*. The resulting data were pre-processed to eliminate words that did not contribute structural meaning to the corpora, prioritising at least one independent semantic meaning per word. Punctuation marks and stop words, such as prepositions, articles, and pronouns, were removed from each document. An iterative Latent Dirichlet Allocation (LDA) analysis of the data was run.

2.2. Topic Modelling

Topic models were studied based on Latent Dirichlet Allocation (LDA), a natural language processing (NLP) tool proposed by Blei et al. (2003) and widely applied in exploratory studies in the health and medical sciences (Parker et al. 2023). Typically used with large-scale unstructured and related corpora, including press reports, LDA extracts underlying or latent topics by observing the probabilistic distribution of words in the corpora (Vellucci 2023). It compares each word with others in a series to determine their degree of co-occurrence and groups them into latent topics that represent the central ideas of the news item.

Validation Metrics

Coherence and perplexity are cross-validation metrics that serve as measures of model fit in LDA. To determine the optimal number of topics for each corpus, we cross-validated the coherence score (i.e., the degree to which the topic can be accurately interpreted by a human) and the perplexity score (the level of generalisation performance, also described as the extent to which the model is surprised by the addition of data it had not seen before). The lower the perplexity score, the higher the generalisation performance, and the higher the coherence, the more accurately a human can interpret the subject.

Based on the results, groups of words were formed according to the number of topics recommended by the validation measures. The resulting words were statistically ordered according to their value for each group, with the 25 most valuable ones being chosen in all cases (i.e., 0.003–0.017).

Once the automated results were produced, a joint review and labelling stage was undertaken to name the topics generated by LDA. According to Parker et al. (2023), computers cannot infer the deep meaning of the content or representation of topics. Thus, news items related to each group were chosen at random to test the appropriateness of the labels, and their content was compared with the names of the selected topics. The general interpretation of the ideas can be found in Section 3.2. of the Results.

3. Results

The findings of the analyses describe the ecosystem of communications on cancer in digital versions of major Chilean and Spanish newspapers.

3.1. Sources and Actors

The automated frequency analyses revealed certain similarities between the most-mentioned actors in both countries, with the WHO ($n = 336$), the national government ($n = 232$), the senate ($n = 230$), and the legislature in general ($n = 216$) being the public bodies and institutions that received the most mentions in Chile. These data were consistent with

the data obtained for Spanish newspapers, although they varied slightly in order, with the national government ($n = 699$) ranked first, followed by the WHO ($n = 648$), the European Union ($n = 344$), and the Ministry of Health ($n = 312$). Private companies specialising in health sciences, including pharmaceutical companies, ranked lower based on the number of mentions, with Pfizer in 6th place in Chile and 11th in Spain; AstraZeneca in 18th place in Chile and 33rd in Spain; and PharmaMar mentioned 92 times in Spain. Patient and family groups and associations along with other foundations were barely represented in the Chilean newspapers. No explicit mention was found of the Chilean Association of Oncology Groups, the National Cancer Corporation, or the Vi-Da and Arturo López Pérez Foundations. In Spain, the non-profit scientific entity SEOM was mentioned 124 times, with the AECC and the Fundación Española de Nutrición being mentioned 54 and 46 times, respectively. Universities had a greater presence in the Chilean information discourse, including the Universidad de Chile ($n = 216$), Pontificia Universidad Católica de Chile ($n = 142$), and the Universidad Adolfo Ibañez ($n = 60$). In Spain, only the Instituto de Salud Carlos III ($n = 49$) was referenced, although other public and private institutions of scientific and academic knowledge included the Consejo Superior de Investigaciones Científicas ($n = 89$), the International Agency for Research on Cancer ($n = 70$), and the Centro Nacional de Investigaciones Oncológicas ($n = 65$). The Chilean press referred to the Fondo Nacional de Salud 70 times and the work of the Centers for Disease Control and Prevention 49 times.

In terms of personalities and public figures, both the Chilean and Spanish press focused more on national and international politicians. In Chile, Rojas Vade ($n = 322$), Joe Biden ($n = 204$), Donald Trump ($n = 146$), and Gabriel Boric ($n = 118$) stood out, whereas in Spain, Prime Minister Pedro Sánchez ($n = 225$), Joe Biden ($n = 152$), and Donald Trump ($n = 141$) were prominent. The Chilean newspapers analysed paid special attention to other national political figures, including former presidents, ministers, deputies, and senators, with Sebastián Piñera, Elisa Loncon, Jaime Bassa, José Antonio Kast, Jaime Mañalich, and Yasna Provoste all standing out. Among public figures in other fields, including sport, religion, literature, and acting, ex-footballer Pelé ranked fourth in Spain and sixth in Chile, Spanish tennis player Carla Suárez ranked ninth in Spain, and Pope Francis received media attention 83 times in Chile. Writers Cristián Warnken and Almudena Grandes were in the top 12 in Chile and Spain, respectively. Lastly, Spain stood out for giving more space to public figures in show business and the tabloid press, as evidenced by the 102 references to Ana Obregón and Álex Lequio.

3.2. Lexical Information Processing

A first reading of the Chilean titles revealed the use of words traditionally associated with infotainment. They included emotionally appealing adjectives such as "heartbreaking", "emotional", "moving", and "promising" and alarmist terms such as "alarming", "dangerous", or "worrying". Apart from them, clickbait was evident in posts titled "How is Pelé doing? The latest on his worrying state of health and why he will have to spend the holidays in hospital" or "Study reveals that cancer drug helps improve oxygenation in critically ill patients due to COVID-19". Otherwise, news exposing risks to public health due to the neglect of risk factors associated with cancer was observed, including "Could having big thighs and cellulite benefit your health? This is what a new study says", in *La Tercera*.

Spanish titles also included elements related to information disorders. Connotative adjectives such as "emotive" continued to appear there, whereas others such as "moving" and "worrying" were less common than in Chile. Others incorporated the alarming word "dangerous", for example, "The big lie of vitamin B17: The dangerous remedy that promises to cure cancer", despite being used to warn against "miracle" treatments. However, clickbait was also present in news from Spain, including "This is the reason why the boy operated by Cavadas died of a giant tumour on his face", in *El Español*.

LDA topic analysis reflected the latent ideas of the published news. The perplexity (-9.3 in Chile and -9.4 in Spain) and coherence (0.5 in both countries) scores intersected

in the number of topics, which approached three. Therefore, three clusters of words were formed from three topics.

The most representative keywords in the model showed figures close to 1. For analysis, we selected the 25 keywords with the highest coherence scores and observed them to determine the most representative topic and tags for each group (Tables 1 and 2) to contrast those results with the content of 25 randomly selected news items.

Table 1. Main topics in Chilean news about cancer.

Chile		
Group	1	2	3
Label or topic name	Health and legislative requests	Cancer as a global phenomenon	Advances in research on carcinogens and cancer treatments
Group size	49.2%	43.4%	7.4%
Dominant keywords	0.010 * "years" 0.005 * "cancer" 0.005 * "year" 0.005 * "country" 0.004 * "part" 0.004 * "health" 0.003 * "life" 0.003 * "family" 0.003 * "law" 0.003 * "people" 0.003 * "crisis" 0.003 * "time" 0.003 * "days" 0.003 * "news" 0.003 * "project" 0.003 * "case" 0.003 * "million" 0.003 * "president" 0.002 * "day" 0.002 * "work" 0.002 * "world" 0.002 * "situation" 0.002 * "minister" 0.002 * "son" 0.002 * "comments"	0.010 * "cancer" 0.010 * "people" 0.009 * "years" 0.009 * "patients" 0.006 * "health" 0.006 * "cases" 0.006 * "coronavirus" 0.005 * "system" 0.005 * "disease" 0.005 * "virus" 0.005 * "study" 0.005 * "diseases" 0.004 * "treatment" 0.004 * "millions" 0.004 * "pandemic" 0.004 * "risk" 0.004 * "country" 0.003 * "year" 0.003 * "medicines" 0.003 * "embargo" 0.003 * "group" 0.003 * "countries" 0.003 * "cells" 0.003 * "vaccine" 0.003 * "patient"	0.008 * "contingency" 0.007 * "director" 0.006 * "president" 0.005 * "situation" 0.005 * "country" 0.004 * "projects" 0.004 * "colour" 0.003 * "teacher" 0.003 * "minister" 0.003 * "div" 0.003 * "padding" 0.003 * "principal" 0.003 * "political contingency" 0.003 * "participation" 0.003 * "real estate projects" 0.003 * "display" 0.002 * "work" 0.002 * "programme" 0.002* "academic" 0.002 * "economist"

* Approximate values for three decimal places.

The Chilean digital newspapers primarily indicate "health and legislative requests" (49.2%), represented by the words *country*, *part*, *health*, *life*, *family*, *law*, *project*, *president*, *news*, and *child*. Under this first topic, most information was about citizen-organised and/or political petitions related to cancer, addressed to public bodies and institutions (e.g., the regulation of euthanasia and the lack of public funding to achieve the objectives of the National Cancer Law).

This latent idea was absent in the Spanish context, in which the main topic was "psycho-social factors" (i.e., the psycho-social and family dimension, accounting for 42.7%), which contained the words *family*, *world*, *country*, *home*, *people*, *child*, *mother*, *father*, and *networks*. Within this topic, information was found that analysed the influence of the family and social environment on cancer, not only for patients already diagnosed but also at all stages of the disease, from cancer prevention (e.g., awareness-raising activities and appeals by patient family associations) to the procurement, distribution, and application of treatments for affected children and dependents. There were also publications on the psychological and emotional support provided by family members of patients with cancer.

Table 2. Main topics in Spanish news about cancer.

	Spain		
Group	1	2	3
Label or topic name	Psycho-social factors (social and family dimension)	Advances in research on carcinogens and cancer treatments	Risk factors/ carcinogens—food
Group size	42.7%	38.1%	19.2%
Dominant keywords	0.012 * "years" 0.007 * "life" 0.006 * "cancer" 0.005 * "time" 0.005 * "family" 0.005 * "year" 0.004 * "day" 0.004 * "world" 0.004 * "time" 0.004 * "days" 0.003 * "part" 0.003 * "country" 0.003 * "house" 0.003 * "months" 0.003 * "woman" 0.003* "people" 0.003 * "illness" 0.003 * "president" 0.003 * "son" 0.003 * "mother" 0.003 * "father" 0.003 * "situation" 0.002 * "networks" 0.002 * "persons" 0.002 * "people"	0.017 * "cancer" 0.008 * "years" 0.008 * "patients" 0.007 * "disease" 0.007 * "illness" 0.006 * "persons" 0.006 * "millions" 0.006 * "treatment" 0.005 * "cases" 0.004 * "risk" 0.004 * "study" 0.004 * "health" 0.004 * "research" 0.004 * "cells" 0.004 * "year" 0.004 * "data" 0.004 * "diseases" 0.003 * "form" 0.003 * "system" 0.003 * "life" 0.003 * "women" 0.003 * "virus" 0.003 * "tumours" 0.003 * "patient" 0.003 * "treatments"	0.012 * "diet" 0.011 * "consumption" 0.009 * "food" 0.008 * "risk" 0.008 * "health" 0.006 * "meat" 0.005 * "seizure" 0.005 * "study" 0.005 * "protein" 0.005 * "fat" 0.005 * "obesity" 0.004 * "weight" 0.004 * "shape" 0.004 * "fibre" 0.004 * "cancer" 0.004 * "type" 0.004 * "diseases" 0.004 * "gluten" 0.003 * "sugar" 0.003 * "benefits" 0.003 * "grams" 0.003 * "products" 0.003 * "amount" 0.003 * "quantity" 0.003 * "fats"

* Approximate values for three decimal places.

The second group of latent topics in Chile was "cancer as a global phenomenon" (43.4%). This group was characterised by the words *patients*, *coronavirus*, *system*, *disease*, *virus*, *pandemic*, *countries* (plural), and *vaccine*. In this regard, we found information on international public health processes and how they affect the reality and development of oncological diseases. Most of the news items focused on the global consequences of the COVID-19 pandemic on the health monitoring and treatment of patients with cancer. Other reports examined budget allocations among countries and their effect on the diagnosis and treatment of the disease. Within this context, there were also news items on comparative risk factors between nations.

The second group of latent topics in Spain coincided with the third in Chile, "content on advances in research on carcinogens and cancer treatments", with 38.1% in Spain and 7.4% in Chile. As can be observed, the topic is less popular in the case of Chile. However, the discourse surrounding this topic differed in the two countries. While the Spanish press used the words *patients*, *million*, *treatment*, *research*, *cells*, *data*, and *case*, the Chilean press used the words *contingency*, *director*, *situation*, *professor*, *participation*, *programme*, *academic*, and *economist*. The news items in the Spanish digital newspapers reported the findings of research on cancer. Most of these texts focused on the discovery of new therapies and treatments. In Chile, research findings on the causes and treatments of cancer were also reported under this topic, although coverage of activities related to the dissemination of such knowledge was also included (e.g., scientific congresses and acts of protest).

Finally, the third group of latent keywords in the Spanish press mostly reflected "food-related risk factors or carcinogens" (19.2%). The words in this group included *diet*, *consumption*, *food*, *meat*, *protein*, *fat*, *obesity*, *weight*, *fibre*, *gluten*, *sugar*, *grams*, *products*, and *quantity*. The information under this topic concerned the influence of diet on the incidence of cancer, that is, whether increased consumption of a certain food group can be a deciding factor in the increased probability of the future development of malignant tumours.

4. Discussion

The results of this study show a general preponderance of references to institutional, administrative, and political sources and actors in cancer communication within the Chilean and Spanish press. To a lesser extent, we found evidence of the presence of some so-called issuers of strategic communication, that is, specialised bodies, academies or research centres, hospitals, and clinics, as well as associations and foundations. Attention paid to associations was especially low, with hardly any mention of patient or family associations. It is necessary to consider that, in the case of cancer, and unlike other health issues, consumer and patient associations—as representatives of civil society—are also key sources of news, while political–technical positions have more measured positions in the origin of information (Revuelta et al. 2012, p. 68). A possible explanation for this phenomenon of the overexposure of institutional, administrative, and political actors, which is present in the news on cancer in the Chilean and Spanish press, lies in the observation that "in the absence of major events, it is government announcements and the reactions they elicit that focus the attention of the press" (Semir et al. 2009, p. 106). It is scheduled events (such as international days dedicated to a specific disease, events at which political–institutional figures are also usually present) that increase the presence of health news in the press, accounting for up to 30% of publications in a study by Costa Sánchez (2008).

One of the novel findings from this article is the existence of the invisibility of some patient groups, an element of information disorders—seen as a broader phenomenon—highlighted by Porroche (2017) and based on the recommendations of the AECC. These results differ from those obtained in previous studies on health in Spain (Saavedra-Llamas et al. 2019), in which attention was focused on certain specialised issuers rather than on administrations and more space was given to patient associations.

In contrast, there was a difference between the main groups of latent topics in oncology journalistic discourse on both sides of the Atlantic. As shown by the comparison, the underlying Spanish lexicon focused on the different factors surrounding the development of cancer and the lives of patients (e.g., "risk factors" and "psycho-social factors"), while the Chilean glossary broadened its vision to a geo-political and institutional health context, based on national claims and the analysis of international reality.

The coincidence of the topic of "advances in research on carcinogens and cancer treatments" suggests that the concern to find a cure for cancer is a relevant topic in the discourse of the international press. This finding is in line with several previous studies utilising multiple approaches. Rubagumya et al. (2023) indicated that cancer treatment information is increasingly available to patients and the public through media, websites, blogs, and social media. Moreover, more than a decade earlier, Fishman et al. (2010) concluded that news about cancer often discussed aggressive treatment and survival rather than treatment failure. Future research could test this hypothesis by studying countries in addition to Chile and Spain.

The findings of this study have at least two limitations. First, this study was conducted based on automated results. It should be noted that a more in-depth, qualitative analysis could enhance and broaden the perspective of communication about oncology in the press. Secondly, the comparative study was carried out instantaneously, which implies that additional longitudinal studies are needed to explore possible similarities and associated differences among discursive elements that may condition journalistic inclination towards information disorders in its broadest sense over time.

As studied by Montemayor-Rodríguez and Torregrosa-Carmona (2019), digital tools and social media are widely used in emergency and crisis situations; thus, it could be understood that journalists, during these periods, compete with a wide range of information sources, with some of them coming from anonymous profiles. Among the challenges facing journalism in terms of regaining control over the agenda is the development of professional and academic specialisation in digital verification. Work on these routines has already commenced in newsrooms (Montemayor Rodríguez and García Jiménez 2021).

Journalists should also consider the roles they play in health-related digital news. In their study, Humanes et al. (2023) found that the journalistic role of providing information and advice was primarily associated with health information.

There are clear elements in the news about cancer in Spain and Chile that distort the reality of the disease in the observed press. Although these findings cannot be labelled as disinformation in its widely accepted sense of malicious intent, these practices could be considered information disorders. One of the main conclusions of our study is that the analysed newspapers cover oncological issues using some elements of infotainment, seeking eye-catching headlines with connotative (emotive and, sometimes, alarmist) words. This is not the first time that content analysis of the Spanish press has shown signs of sensationalism in this area. In an analysis of the quality of information, Costa Sánchez (2008) concluded that 26.3% of health news items in the main Galician newspapers were sensationalist or anecdotal.

In addition, popular personalities—celebrities and international political figures—who have suffered or are suffering from cancer, either directly or through their relatives, were mentioned in particular. This was evident in the cases of Joe Biden, Pelé, Lula da Silva, Jesús Mariñas, and Ana Rosa Quintana in Spain and Lula da Silva, Pelé, and Pamela Figueroa in Chile. Revuelta et al. (2012) found that research on new treatments and reports with epidemiological data on cancer attract more public attention when they are discussed in relation to the diagnosis of cancer in high-profile media personalities.

Clickbait is often employed, with some dubious scientific information that can be confusing to most of the specialised scientific community. This content may threaten the widely established knowledge about cancer prevention. For example, news reports rely on studies to cast doubt on whether abdominal fat—categorised as a carcinogen—has detrimental health implications. The continuation of this scheme could carry serious implications for public trust and credibility.

It seems necessary to establish a balance between infotainment and automated news. It is recommended that journalists return to focusing on non-routine, non-automated content that generates value for citizens, thus aligning with the original conception of the press, or at least using these tools in a supervised manner. Several studies have tested the quality of AI-generated journalistic content in recent years. Ufarte Ruiz and Manfredi Sánchez (2019) concluded that news generated by *Gabriele* software lacks diversity in viewpoints and quality of sources, context, and interpretation. These elements are also related to the development of communicative practices that lead to a detachment from the broader realities of health, according to Porroche (2017). In short, for Villoro (2015), information professionals should be oriented towards careful, reflective, and thoughtful writing. This would be a response to some of the new demands arising from the social, business, and technological environment, in which journalism develops, and to which this study aims to add as a contribution.

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References

AECC. 2006. *Guía de estilo. Salud y medios de comunicación. El cáncer*. Madrid: Asociación Española Contra el Cáncer.

AHCJ (s.f.). n.d. *Suage that should be avoided in health coJournalists*. Association of Health Care Journalists. Available online: https://healthjournalism.org/about/principles-and-policies/statement-of-principles-of-the-association-of-health-care-journalists/ (accessed on 11 January 2024).

Amoedo, Avelino A., Elsa Moreno, Samuel Negredo, Jürg Kaufmann-Argueta, and Alfonso Vara-Miguel. 2023. *Digital News Report España 2023*. Pamplona: Servicio de Publicaciones de la Universidad de Navarra. Oxford: Reuters Institute. [CrossRef]

Anguita, Pedro, Ingrid Bachmann, Lionel Brossi, Claudio Elórtegui, María José Escobar, Paulina Ibarra, J. Carlos Lara, Fabián Padilla, and Patricia Peña. 2023. *El fenómeno de la desinformación: Revisión de experiencias internacionales y en Chile*. Santiago: Comité Asesor contra la Desinformación. Ministerio de Ciencia, Tecnología, Conocimiento e Innovación. Available online: https://minciencia.gob.cl/uploads/filer_public/26/cb/26cb92cb-5614-4e7c-a46e-f001a2b838b1/informe_i_-_el_fenomeno_de_la_desinformacion_global_y_en_chile_1.pdf (accessed on 28 November 2023).

Assis, Mônica. 2023. Comunicação em Saúde na Prevenção e Detecção Precoce do Câncer: Em Busca de Práticas mais Dialógicas e Inclusivas. *Revista Brasileira de Cancerologia* 69: e-032879. [CrossRef]

AZERTAC. 2023. *El 4 de febrero se celebra el Día Mundial contra el Cáncer*. Agencia Informativa Estatal de Azerbaiyán. Available online: https://azertag.az/es/xeber/El_4_de_febrero_se_celebra_el_Da_Mundial_contra_el_Cncer-2475422 (accessed on 8 October 2023).

Belghanou Tarhouli, Lamiae. 2022. *Tratamiento informativo sobre la enfermedad mental en los medios de comunicación* [Tesis de Grado, Universidad Miguel Hernández]. Available online: http://dspace.umh.es/handle/11000/27787 (accessed on 15 October 2023).

Blei, David M., Andrew Y. Ng, and Michael I. Jordan. 2003. Latent Dirichlet Allocation. *Journal of Machine Learning Research* 3: 993–1022.

Camacho Markina, Idoia, Udane Goikoetxea Bilbao, and Iñigo Marauri Castillo. 2023. Estigmatización social en el tratamiento informativo de la obesidad en la prensa española durante la pandemia. *Revista Latina de Comunicación Social* 81: 250–74. Available online: https://www.doi.org/10.4185/RLCS-2023-1895 (accessed on 15 October 2023).

Carrasco García, Miguel Angel, Carola Neira-Mellado, Bárbara Klett, and Luis Cárcamo-Ulloa. 2021. Representación de la incidencia y de la mortalidad por cáncer en los medios de comunicación chilenos. *Revista Médica de Chile* 149: 716–23. [CrossRef]

Corbacho-Valencia, Juan Manuel, Alberto Dafonte-Gómez, and María Isabel Míguez González. 2018. ¿Son útiles los posts de Facebook favoritos de los usuarios para generar públicos informados y activos? Estudio de caso de las organizaciones contra el cáncer de mama. *Revista Internacional de Relaciones Públicas* 15: 177–96. [CrossRef]

Costa Sánchez, Carmen. 2008. Medicina y salud en la prensa. Las noticias de salud en los principales diarios de Galicia. *Revista Latina de Comunicación Social* 63: 15–21. [CrossRef]

Del-Fresno-García, Miguel. 2019. Desórdenes informativos: Sobreexpuestos e infrainformados en la era de la posverdad. *El Profesional de la Información* 28: e280302. [CrossRef]

DRAE. 2014. Desinformación. In *Diccionario de la lengua Española*. Real Academia Española. Available online: https://dle.rae.es/desinformaci%C3%B3n?m=form (accessed on 11 January 2024).

El Mikati, Ibrahim K., Reem Hoteit, Tarek Harb, Ola El Zein, Thomas Piggott, JadMelki, Reem A. Mustafa, and Elie A. Akl. 2023. Defining Misinformation and Related Terms in Health-Related Literature: Scoping Review. *Journal of Medial Internet Research* 25: e45731. [CrossRef]

Espinoza, Elizabeth, and Cesar Mazuelos. 2020. Desinformación sobre temas de salud en las redes sociales. *Revista Cubana de Información en Ciencias de la Salud* 31: e1498. Available online: https://www.redalyc.org/articulo.oa?id=377665620002 (accessed on 15 October 2023).

Fernández, F. J., and E. Núñez-Mussa. 2023. Weekly reach offline and online. Chile. In *Digital News Report 2023*. Edited by Nic Newman, Richard Fletcher, Kirsten Eddy, Craig T. Robertson and Rasmus Kleis Nielsen. Oxford: Reuters Institute. Oxford: University of Oxford.

Fernández-Gómez, Erika, and Jesús Díaz-Campo. 2016. Comunicación sobre el cáncer en Facebook. Las asociaciones de Argentina, Chile, Colombia y España (Cancer communication on Facebook. Associations in Argentina, Chile, Colombia and Spain). *Cuadernos.info* 38: 35–50. [CrossRef]

Fishman, Jessica, Thomas Ten Have, and David Casarett. 2010. Cancer and the media: How does the news report on treatment and outcomes? *Archives of Internal Medicine* 170: 515–18. [CrossRef]

García Salguero, Cristina. 2018. *El cáncer en el programa de TVE Saber Vivir en el periodo 2014–2017: Un análisis de contenido* [Tesis de Grado, Universidad de Sevilla]. Available online: https://idus.us.es/handle/11441/79149 (accessed on 27 November 2023).

Grassau, Daniela, Sebastián Valenzuela, Ingrid Bachmann, Claudia Labarca, Constanza Mujica, Daniel Halpern, and Soledad Puente. 2019. *Estudio de opinión pública: Uso y evaluación de los medios de comunicación y las redes sociales durante el estallido social en Chile*. Santiago: Facultad de Comunicaciones, Pontificia Universidad Católica de Chile, pp. 1–64. [CrossRef]

Grassau, Daniela, Sebastián Valenzuela, Ingrid Bachmann, Claudia Labarca, Constanza Mujica, Daniel Halpern, and Soledad Puente. 2020. *Comunicaciones, desinformación y emociones en la pandemia COVID-19 en Chile*. Santiago: Facultad de Comunicaciones, Pontificia Universidad Católica de Chile, pp. 1–37. [CrossRef]

Humanes, María Luisa, Gema Alcolea-Díaz, Joaquín López-del-Ramo, and Claudia Mellado. 2023. Performance of journalistic professional roles in digital native media news in Spain: Toward a journalistic micro-culture of its own. *Profesional de la información* 32: e320225. [CrossRef]

International Agency for Research on Cancer (IARC). 2021. *Cancer Surveillance Branch (CSU)*. Available online: https://www.iarc.who.int/branches-csu/ (accessed on 8 October 2023).

Ireton, Cherilyn, and Julie Posetti, eds. 2020. Journalism, 'Fake News' & Disinformation. Handbook for Journalism Education and Training. UNESCO Series on Journalism Education. Available online: https://unesdoc.unesco.org/ark:/48223/pf0000265552 (accessed on 7 October 2023).

Izquierdo, Alejandro, Carola Pessino, and Guillermo Vuletin. 2018. *Mejor gasto para mejores vidas. Cómo America Latina y el Caribe puede hacer más con menos*. Desarrollo en las Américas. Capítulo 8. Banco Interamericano de Desarrollo. Available online: https://bit.ly/3QQHqK9 (accessed on 28 November 2023).

Lewandowsky, Stephan, Ullrich K. H. Ecker, and John Cook. 2017. Beyond misinformation: Understanding and coping with the "post-truth" era. *Journal of Applied Research in Memory and Cognition* 6: 353–69. [CrossRef]

López, Fernando, and Jorge Miguel Rodríguez. 2020. El Fact Checking en España. Plataformas, prácticas y rasgos distintivos. *Estudios sobre el Mensaje Periodístico* 26: 1045–65. [CrossRef]

Matus Lobos, Pablo. 2023. Representaciones Discursivas e Imaginario de la Salud Mental en la Prensa Chilena (2018–2019). Discursive Representations and Imaginary of Mental Health in the Chilean Press (2018–2019). *Universum. Revista de Humanidades y Ciencias Sociales* 38: 303–22. [CrossRef]

Mila-Maldonado, Juan Arturo, and Xosé Soengas-Pérez. 2021. El papel de la prensa chilena en contextos de emergencia sanitaria. Tratamiento informativo del COVID-19 en el diario digital El Mercurio. *Cuaderno. Cuadernos del Centro de Estudios en Diseño y Comunicación* 136: 153–65. [CrossRef]

Miller, Lee J., and Wei Lu. 2018. *These Are the Economies With the Most (and Least) Efficient Health Care*. Bloomberg Health-Efficiency Index. Available online: https://www.bloomberg.com/news/articles/2018-09-19/u-s-near-bottom-of-health-index-hong-kong-and-singapore-at-top#xj4y7vzkg (accessed on 28 November 2023).

Montemayor Rodríguez, Nancy, and Antonio García Jiménez. 2021. Percepción de los periodistas sobre la desinformación y las rutinas profesionales en la era digital. *Revista General de Información y Documentación* 31: 601–19. [CrossRef]

Montemayor-Rodríguez, Nancy, and Juan Francisco Torregrosa-Carmona. 2019. Información y documentación en Internet. El cambio en la Agenda-Setting por la influencia de los nuevos medios y redes sociales. *Creatividad y sociedad: Revista de la Asociación para la Creatividad* 30: 125–44.

Mora Bello, Diego. 2022. VIH en los medios. Investigación sobre el cubrimiento al VIH y sida en medios online de América Latina, el Caribe y España. *Temas De Comunicación*, 245–99. Available online: https://revistasenlinea.saber.ucab.edu.ve/index.php/temas/article/view/5630 (accessed on 15 October 2023).

Nan, Xiaoli, Yuan Wang, and Kathryn Their. 2022. Why do people believe health misinformation and who is at risk? A systematic eview of individual differences in susceptibility to health misinformation. *Social Science and Medicine* 314: 115398. [CrossRef] [PubMed]

Negredo, Samuel. 2023. La mitad de los usuarios prefieren leer al informarse por internet, y quiénes optan por escuchar las noticias en línea crece al 14% (Half of Users Prefer to Read When Getting Information online, and Those Who Choose to Listen to Online News Grows to 14%). *Digital News Report España* 2023. Available online: https://www.digitalnewsreport.es/2023/la-mitad-de-los-usuarios-prefiere-leer-al-informarse-por-internet-y-quienes-optan-por-escuchar-las-noticias-en-linea-crece-al-14/ (accessed on 11 January 2024).

Newman, Nic. 2023. *Journalism, Media, and Technology Trends and Predictions 2023*. Oxford: Reuters Institute for the Study of Journalism.

Núñez-Gómez, P., N. Abuín-Vences, J. Sierra-Sánchez, and L. Mañas-Viniegra. 2020. El enfoque de la prensa española durante la crisis del Covid-19. Un análisis del *framing* a través de las portadas de los principales diarios de tirada nacional. *Revista Latina De Comunicación Social* 78: 41–63. [CrossRef]

Olmo, Julia Alicia. 2019. *Desinformación: Concepto y perspectivas*. Elcano Royal Institute. Available online: https://www.realinstitutoelcano.org/analisis/desinformacion-concepto-y-perspectivas/ (accessed on 11 January 2024).

Parejo Cuéllar, Macarena, and Daniel Martín-Pena. 2020. Tratamiento informativo de la prensa española sobre el COVID-19 antes del estado de alarma. *Revista Española de Comunicación en Salud* 1: 218–25. [CrossRef]

Parker, Maria A., Danny Valdez, Varun K. Rao, Katherine S. Eddens, and Jon Agley. 2023. Digital Epidemiology of Prescription Drug References among Twitter Users: Results and Methodological Implications from Latent Dirichlet Allocation (LDA). *Journal of Medical Internet Research* 25: 6–30. [CrossRef] [PubMed]

Peña-Fernández, Simón, Koldobika Meso-Ayerdi, Ainara Larrondo-Ureta, and Javier Díaz-Noci. 2023. Without journalists, there is no journalism: The social dimension of generative artificial intelligence in the media. *Profesional de la Información* 32: e320227. [CrossRef]

Pérez-Curiel, Concha, and Andeu Casero-Ripollé. 2022. La lucha contra la desinformación en la sociedad post-pandemia: Un reto para el periodismo y más allá. In *El problema de la verdad. Retos y riesgos en la comunicación*. Edited by Francisco Javier Caro-González, Manuel Garrido-Lora and María del Mar García-Gordillo. Salamanca: Comunicación Social Ediciones y Publicaciones. I.

Porroche, Ana. 2017. Problematizando la desinformación en las campañas de concienciación sobre el cáncer de mama. *Gaceta Sanitaria* 31: 250–52. [CrossRef] [PubMed]

Puebla-Martínez, Belén, Nuria Navarro-Sierra, and Gema Alcolea-Díaz. 2021. Methodological Proposal for the Detection of the Composing Elements of Vulnerability Regarding Disinformation. *Publications* 9: 44. [CrossRef]

Ratzan, Scott C. 2017. The future of helth communication: Innovating through partnerships. *Mètode Science Studies Journal* 6: 193–99. [CrossRef]

Ratzan, Scott C., Silvia Sommarivac, and Lauren Rauh. 2020. Enhancing global health communication during a crisis: Lessons from the COVID-19 pandemic. *Public Health Research and Practice* 30: e3022010. [CrossRef]

Revuelta, Gema, Vladimir de Semir, Clara Armengou, and Gianfranco Selgas. 2012. Informe Quiral 2011: Cáncer. Observatori de la Comunicació Científica y Universitat Pompeu Fabra. Available online: https://www.fundaciovilacasas.com/download-publicacio.php?id=601 (accessed on 10 January 2024).

Robles, Bernabé. 2021. Ética y desinformación en salud (III). *Bioética & Biodebate* 27: 14–21.

Rubagumya, Fidel, Jacqueline Galica, Eulade Rugengamanzi, Brandon A. Niyibizi, Ajay Aggarwal, Richard Sullivan, and Christopher M. Booth. 2023. Media coverage of cancer therapeutics: A review of literature. *Journal of Cancer Policy* 36: 100418. [CrossRef]

Rubio Ferreres, José María. 2009. Opinión pública y medios de comunicación. Teoría de la agenda setting (Public opinion and the media. Agenda setting theory). *Gazeta de Antropología* 25: 1–17. Available online: http://hdl.handle.net/10481/6843 (accessed on 23 September 2023).

Saavedra-Llamas, Marta, Mercedes Herrero-De-la-Fuente, Leticia Rodríguez-Fernández, and Jiménez-Narros Carlos. 2019. Información de salud: Fuentes periodísticas y desafíos profesionales. *El Profesional de la Información* 28: e280208. [CrossRef]

Salaverría, Ramón. 2021. Entender y combatir la desinformación sobre ciencia y salud. In *Ministerio de Ciencia e Innovación*. Informe del Grupo de Trabajo Multidisciplinar (GTM), 20 de febrero. Available online: https://digital.csic.es/bitstream/10261/239480/1/Entender_y_combatir_la_desinformacion_sobre_ciencia_y_salud.pdf (accessed on 10 January 2024).

Sádaba, Charo, and Ramón Salaverría. 2023. Combatir la Desinformación con Alfabetización Mediática: Análisis de las Tendencias en la Unión Europea. *Revista Latina de Comunicación Social* 81: 17–33. [CrossRef]

Sánchez Duarte, José Manuel, and Raúl Magallón-Rosa. 2023. Desinformación. Eunomía. *Revista en Cultura de la Legalidad* 24: 236–49. [CrossRef]

Semir, Vladimir de, Gema Revuelta, Maria Roura, Marta Asensio, Gema López, Miriam Peláez, Montserrat Daban, Eva Tarragona, and Raquel Lastra. 2001. *Informe Quiral 2000. Conclusiones y discusión*. Observatori de la Comunicació Científica y Universitat Pompeu Fabra. Available online: https://www.fundaciovilacasas.com/download-publicacio.php?id=633 (accessed on 10 January 2024).

Semir, Vladimir de, Gema Revuelta, Mar Santamaría, Gretty Chirinos, Nuria Alba, Lucía Díaz, and Diana Marcela Rosero. 2009. *Informe Quiral 2008*. Observatori de la Comunicació Científica y Universitat Pompeu Fabra. Available online: https://www.fundaciovilacasas.com/download-publicacio.php?id=626 (accessed on 10 January 2024).

Semir, Vladimir de, Gema Revuelta, Raimundo Roberts, Miguel Antonio Tapia, Montserrat Daban, Gretty Chirinos, Laia Fernández, Elvira Lozano, Pilar Miró, and Eva Tarragona. 2004. *Informe Quiral 2003*. Observatori de la Comunicació Científica y Universitat Pompeu Fabra. Available online: https://www.fundaciovilacasas.com/download-publicacio.php?id=630 (accessed on 10 January 2024).

Semir, Vladimir de, Gema Revuelta, Raimundo Roberts, Montserrat Daban, Gretty Chirinos, Pablo Gallegos, Pilar Miró, Guillermo Santamaría, and Eva Tarragona. 2005. *Informe Quiral 2004*. Observatori de la Comunicació Científica y Universitat Pompeu Fabra. Available online: https://www.fundaciovilacasas.com/download-publicacio.php?id=629 (accessed on 10 January 2024).

SEOM. 2017. *Las cifras del cáncer en España 2017*. Sociedad Española de Oncología Médica. Available online: https://www.seom.org/seomcms/images/stories/recursos/Las_cifras_del_cancer_en_Esp_2017.pdf (accessed on 23 September 2023).

SEOM. 2023. *Las cifras del cáncer en España 2023*. Sociedad Española de Oncología Médica. Available online: https://seom.org/images/Las_cifras_del_Cancer_en_Espana_2023.pdf (accessed on 8 October 2023).

Sotelo Rodríguez, Diana Carolina. 2020. Pandemias, información y medios: COVID-19, un ejemplo a través de la crisis (Pandemics, information and media: COVID-19, an example through the crisis). *Medicina* 42: 143–46. [CrossRef]

Southwell, Brian G., Emily A. Thorson, and Laura Sheble. 2017. The persistence and peril of misinformation. *American Scientist* 105: 372–75. [CrossRef]

Stanojlovic, Milena. 2015. Percepción social de riesgo: Una mirada general y aplicación a la comunicación de salud (Social perception of risk: An overview and application to health communication). *Revista de Comunicación y Salud* 5: 99–110. [CrossRef]

Swire-Thompson, Briony, and Skyler Johnson. 2024. Cancer: A model topic for misinformation researchers. *Current Opinion in Psychology* 56: 101775. [CrossRef] [PubMed]

Ufarte Ruiz, María José, and Juan Luis Manfredi Sánchez. 2019. Algoritmos y bots aplicados al periodismo. El caso de Narrativa Inteligencia Artificial: Estructura, producción y calidad informativa. *Doxa Comunicación* 29: 213–33. [CrossRef]

Valenzuela, Sebastián, Daniel Halpern, James E. Katz, and Juan Pablo Miranda. 2019. The Paradox of Participation Versus Misinformation: Social Media, Political Engagement, and the Spread of Misinformation. *Digital Journalism* 7: 802–23. [CrossRef]

Vellucci, Pierluigi. 2023. Conspiracy Thinking, Online Misinformation, and Hate: Insights from an Italian News Story Using Topic Modeling Techniques. *Journalism and Media* 4: 1048–64. [CrossRef]

Vernier, Matthieu, Fabian Ruiz, Boris Sotomayor, Marta Mensa, and Luis Cárcamo. 2023. *Sophia2: Robust Methods Based on Computational Linguistics and Machine Learning to Analyse Media Pluralism.* Institute of Informatics, Austral University of Chile. Available online: https://inf.uach.cl/investigacion/sophia-2/ (accessed on 25 November 2023).

Villoro, Juan. 2015. *Periodismo Robot.* El Periódico. October 13. Available online: https://www.elperiodico.com/es/opinion/20150815/periodismo-robot-4433311 (accessed on 29 November 2023).

Wardle, Claire, and Hossein Derakhshan. 2017. *Information Disorder: Toward an Interdisciplinary Framework for Research and Policy Making.* Council of Europe report DGI. September. Available online: https://rm.coe.int/information-disorder-reportnovember-2017/1680764666 (accessed on 11 January 2024).

Waszak, Przemyslaw M., Wioleta Kasprzycka-Waszak, and Alicja Kubanek. 2018. The spread of medical fake news in social media-The pilot quantitative study. *Health Policy and Technology* 7: 115–18. [CrossRef]

WHO. 2022. *Cáncer. Datos y cifras.* World Health Organization. Available online: https://www.who.int/es/news-room/fact-sheets/detail/cancer (accessed on 8 October 2023).

Wild, Chris, Elisabete Weiderpass, and Bernard W. Stewart. 2020. *World Cancer Report: Cancer Research for Cancer Prevention. World Cancer Reports.* International Agency for Research on Cancer. Available online: https://publications.iarc.fr/586 (accessed on 8 October 2023).