The debate on vaccines in social networks: an exploratory analysis of links with the heaviest traffic

O debate sobre vacinas em redes sociais: uma análise exploratória dos *links* com maior engajamento

El debate sobre vacunas en redes sociales: un análisis exploratorio de los enlaces con mayor participación activa

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Abstract

This study aims to analyze Internet traffic and interactions on social networks concerning vaccines. The 100 most widely shared, liked, and commented links were visited with the keyword "vaccine" from May 2018 to May 2019 to identify the main subjects, sources, and positions. The qualitative study phase used Discourse Analysis to identify modes of production of principal meanings in the chats. We further studied the fake news in the most widely shared links. The results point to a majority position in favor of vaccines (87.6%) and strong interest in health-related themes, scientific development, and health policies. Meanwhile, some of the mostly widely accessed sources of information in Brazil had no information on editorial criteria, policies, or authors, making it difficult to determine the quality and veracity of the information consumed in social networks in Brazil. Fake news accounted for 13.5% of the links with the heaviest traffic, raising concerns about misinformation on vaccines. These results point to important communication dynamics related to vaccines and opportunities to improve public communication on vaccination.

Vaccines; Social Networking; Scientific Communication and Diffusion

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Introduction

Mass vaccination is a fundamental contribution by scientific research to societies' daily life on a global level. It is one of the most powerful resources in public health practice, participating directly in the control and eradication of various diseases, while protecting entire populations. Although the results of immunization have been extremely successful, studies suggest that there has been a rise in distrust towards vaccination in the last decade, such that a growing number of people refrain from vaccinating themselves and their children [1]. In the United States, the proportion of parents that express some concern towards vaccines increased from 19% in 2000 to 50% in 2009 [2]. Among physicians, 89% reported in a survey in 2010 at least one case a month of parents who refused to vaccinate their children [3].

This decision not only poses a personal risk, but also generates large-scale consequences, since it allows the resurgence of diseases that had already been controled [4]. A case in point is measles, which had been controlled by 2000 in the United States and by 2016 in Brazil. However, measles incidence has grown exponentially in the entire world, especially in Europe and the United States, leading the United Nations Children's Fund (UNICEF) to launch the *#VaccinesWork* campaign in April 2019, calling attention to the fact that every year more 20 million children worldwide fail to receive the measles vaccine [5]. According to the World Health Organization (WHO), the refusal to vaccinate when vaccination is available is already one of the world's ten worst health risks [6].

Public campaigns in Brazil have faced growing difficulty in reaching vaccination targets, as in the case of the HPV in 2014 [7]. The issue is aggravated by the mass propagation of fake news, as in the yellow fever epidemic in 2017 and 2018 [8]. Diseases that had already been controlled have rebounded to alarming levels, as in the measles outbreak in 2018 [1,4]. Although there may have been multiple determinants in these numbers, such as lack of access to health services, beside fear or skepticism towards vaccines [9], it is essential to understand the role of health information in this context, more specifically in a medium that has gained growing relevance as an information source on science: the Internet.

Studies have highlighted how the expansion of access to digital communications has turned the Internet into one of the most relevant sources of the population's information on health [10]. In the digital setting, part of health professionals' authority is gradually transferred to patients, who assume the responsibility for informing themselves [11,12]. "Expert patients" are not just well-informed citizens, but special consumers of health content who see themselves as "versed in the subject" and potentially resistant to professional orientation [13]. Still, access to large volumes of information does not necessarily prepare users to check the veracity of what they consume. Paradoxically, empirical studies have shown that Internet users claim they attest to the information's credibility via sources of the sites and scientific language; in practice, however, most internauts limit themselves to opening the first search results, do not attempt to identify the authors, and rarely remember where they accessed certain information [14].

Although growing access to information has brought benefits, it also provides fertile ground for spreading false information and fueling radical positions. Fake news can be defined as rumor or intentionally misleading information with the deliberate purpose of generating misinformation and harming persons, social groups, organizations, or even countries [15,16,17]. Such contents often employ sensationalist headlines, texts, and images that hold attention and spread rapidly on the web. The overload and repetition of messages can lead people to "become familiar" with false information, hindering their perception and judgment of its veracity [18].

Fake news thus poses an important contemporary problem, not only from the social and political point of view, but also in public health terms. In the case of vaccines, although safety concerns date back to historical contexts, the advent of social media expanded this phenomenon, allowing the spread of what UNICEF called *"the real infection of misinformation"* [19]. The Internet became a prime field for expansion of the anti-vaccination discourse, characterized by a series of objections based on: a purported correlation between vaccines and poorly explained ills; disregard for the severity of infectious diseases; insinuations of the presence of mercury compounds; defense of civil liberties in the face of the compulsory nature of vaccination; and an appeal to resist lucrative pharmaceutical corporations [20].

In a study of 140 countries in the year 2018, the Wellcome Global Monitor [1] investigated the opinions and attitudes of more than 140,000 persons towards science and health, offering a broad

view of these issues. Most interviewees agreed completely or partly that vaccines are effective (84%) and safe (79%). In South America, 82% agreed that they were effective and 81% that they were safe. Although the data point to a positive trend, the study also revealed that persons who recently searched for information on science (74%) or medicine and health (75%) were less inclined to agree with vaccines' safety than those who had not searched for such information (81% and 82%, respectively). These results point to the need for qualitative studies to understand what kind of information has been consumed on vaccines in different contexts and how such information has contributed to forming public opinion on this issue.

In Brazil, despite acknowledgement of vaccines' importance, the rapid spread of false information points to a growing anti-science discourse [8]. The current study thus aims to understand which information on vaccines was consumed and shared most frequently on social networks in the recent Brazilian context. We analyzed the most widely circulating information on vaccines during the study period in popular Portuguese-language texts on social networks, observing themes, frameworks, and positions (for versus against vaccines). Our study also analyzes which types of online vehicles Brazilians use as sources of scientific information. Our working hypothesis is that the online environment provides new patterns in the production, consumption, and distribution of health information, in which the criteria for assessing credibility have not been fully explained or consolidated. Given this "information disorder" [17], the Internet has become the stage for tensions between pro- and anti-vaccination discourses in the Brazilian context.

Methods

The study involved two methodological phases: collection of empirical material and analysis of the results. In the first phase, BuzzSumo (https://buzzsumo.com/) was applied to the 100 links that were enjoying the greatest popularity on social networks, using the keyword "vaccine". BuzzSumo is a digital monitoring tool for measuring the most widely shared contents on social networks. The tool's free version was used for the study's purposes. The search was conducted on May 21, 2019, covering the links with the heaviest traffic (shares, likes, and commentary) on Facebook, Twitter, Pinterest, and Reddit from May 22, 2018 to May 21, 2019. Data were exported and saved to a spreadsheet for analysis after the seven free days offered by the service. Although the search did not cover publications in closed chat groups, where anti-vaccination contents find strong backing [21], this step gave us an overview of the public debates on social networks.

Eleven of the 100 links were inactive during the study period, so it was not possible to access them. The valid sample thus consisted of 89 links. Within the immense amount of potential data circulating in the online environment [22,23], this cross-section allowed understanding which discourses on vaccination were shared and commented most frequently during this period, sparking public interest and framing communications on this issue in the networks.

The second phase involved discourse analysis of the data collected with BuzzSumo. Discourse analysis is a methodology that rejects the idea that language merely describes the world neutrally, rather contending that it plays a central role in building social life [24]. Among the various theoretical currents in discourse analysis, we adopted the Pinto perspective [25], viewing discourse as a social practice belonging to a context, based on which the meanings produced are analyzed critically in order to understand the symbolic disputes, ideological biases, and power relations engendered by these contents. Rather than verifying what the text says, discourse analysis is concerned with how and why it is said, that is, its ways of saying. In short, analyzing discourses that circulate in social networks based on discourse analysis allows reflecting on the sociohistorical context in which they are produced, posted, and consumed.

We followed the characteristic steps described by Gill [24] for discourse analysis: formulation of research questions; selection of the corpus; reading of the texts, informed by the theoretical framework; coding in analytical categories; new reading and examination of the data; and finally, discussion of the results. Based on the study's objectives, we formulated the following categories: (i) theme, observing which diseases and frameworks appeared most often in these discourses; (ii) position, analyzing whether the posts were for or against vaccination; (iii) veracity, using factchecking

procedures to determine whether the text included proven information or fake news; and (iv) type of vehicle, to identify who posted the information and which text formats were the most widely shared on vaccination.

We further subdivided the latter category into professional and non-professional vehicles. Based on studies that determine reliability criteria for information sources in health [26,27], we used the following factors to consider a vehicle professional: well-defined editorial vision and policy; specification of a physical address; identification of the authors; and citation of the information sources. All other sites were considered non-professional. The aim was not to establish a dichotomy between reliable professional sites and unreliable amateur sites, but to understand a media ecosystem in which blogs and sites of varieties emerge as prime sources on science and health themes, alongside consolidated medias associated with large communication companies.

Results

The sample of the 89 links with the most traffic provides clues for understanding how meanings are produced on vaccines in the public debates on the social networks. The categories theme, position, veracity, and type of vehicle were established to verify which discourses circulate, the predominant visions and enunciators, and the information's reliability. As for themes, there are different frameworks by which vaccination is addressed, with a predominance of the field of science and health (38 stories, or 42.7% of the total) and policy (25 stories, or 28.1%) (Figure 1).

The area of health and science sparked the greatest interest among users, with the highest volume of links commented, liked, and shared. Most of these stories addressed studies on new vaccines, new applications for known vaccines, and the safety of these preparations. There were also smaller amounts of tips and information on selfcare, such as the importance of the herpes zoster vaccine in individuals over 50 years of age and family care before the arrival of a new baby.

The policy field also received wide coverage. This scope included discussions on the promotion and expansion of vaccination coverage and concerns about vaccination targets. There was also a major focus on Brazil's former President Luiz Inácio Lula da Silva, whose grandson had died in March 2019 with a suspected diagnosis of meningitis (ultimately not confirmed). A large volume of both true

Figure 1

Subjects or topics most addressed in the texts generating the heaviest traffic in social networks from May 2018 to May 2019, containing the keyword "vaccine".
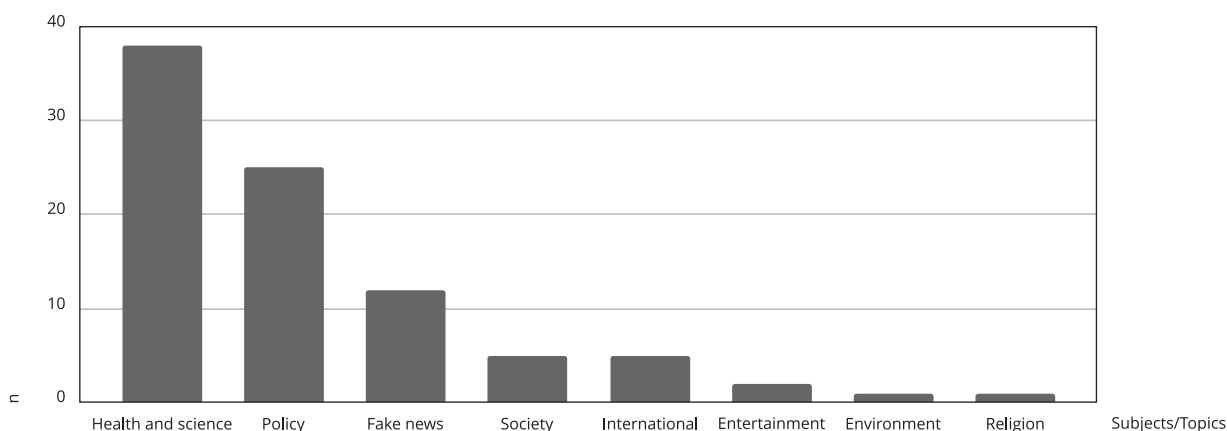
news stories and fake news addressed the subject, discussing measures under the former President's Administration on the vaccines available in the Brazilian Unified National Health System (SUS).

There were also current affairs stories, classified as "society" news, such as the robbery of a truck with batches of vaccines in Rio de Janeiro and vaccination of prison inmates. Topics like an Italian law to refuse school enrollment for unvaccinated children, the humanitarian crisis in the Democratic Republic of Congo, and the global rise in measles and polio cases were classified as "international".

This division by subject matter was done arbitrarily in order to perceive each text's predominant field. Thus, stories like *Anti-Vaccination Politician Hospitalized with Chickenpox*, in the *Claudia* magazine, although intersecting with the discussion on policy and health, was classified here as international, since it was about the anti-vaccination movement's spinoffs in country outside Brazil.

Fake news accounted for 13.5% of the links with the heaviest traffic. The weight of fake news in this scenario is also evidenced by the amount of contents produced by factchecking. In all, there were seven stories (7.86%) debunking fake news, three of which in newspapers (*Zero Hora*, *UOL*, and *Último Segundo*), two on sites specialized in factchecking (*E-farsas* and *Boatos.org*), one institutional (Brazilian Association of Public Health – Abrasco), and one on a political commentary site (*Plantão Brasil*).This shows that the concern with the information's veracity is also a factor for traffic on social networks.

During the period analyzed here, we also observed a predominance of stories on meningitis, largely driven by the death of former President Lula's grandson. There were 18 links discussing the subject, ranging from government measures to the demand for the vaccine at health posts and clinics. There was also strong interest in diseases like canine leishmaniasis (seven links), HIV/AIDS (seven), cancer (five), yellow fever (four), allergies (four), and drug addiction (four). Eight links involved discussions that were not exclusive to a specific disease, such as the situation of children of incarcerated mothers or studies ruling out an association between vaccines and autism (Figure 2).

The total number of diseases addressed exceeds the number of links, because some links addressed more than one disease, such as the Brazilian study stating that the yellow fever vaccine could protect against Zika, a story carried by *BBC Brazil*. There was also considerable coverage for "therapeutic

Figure 2

Diseases most addressed in the texts generating the heaviest traffic in social networks from May 2018 to May 2019, containing the keyword "vaccine".
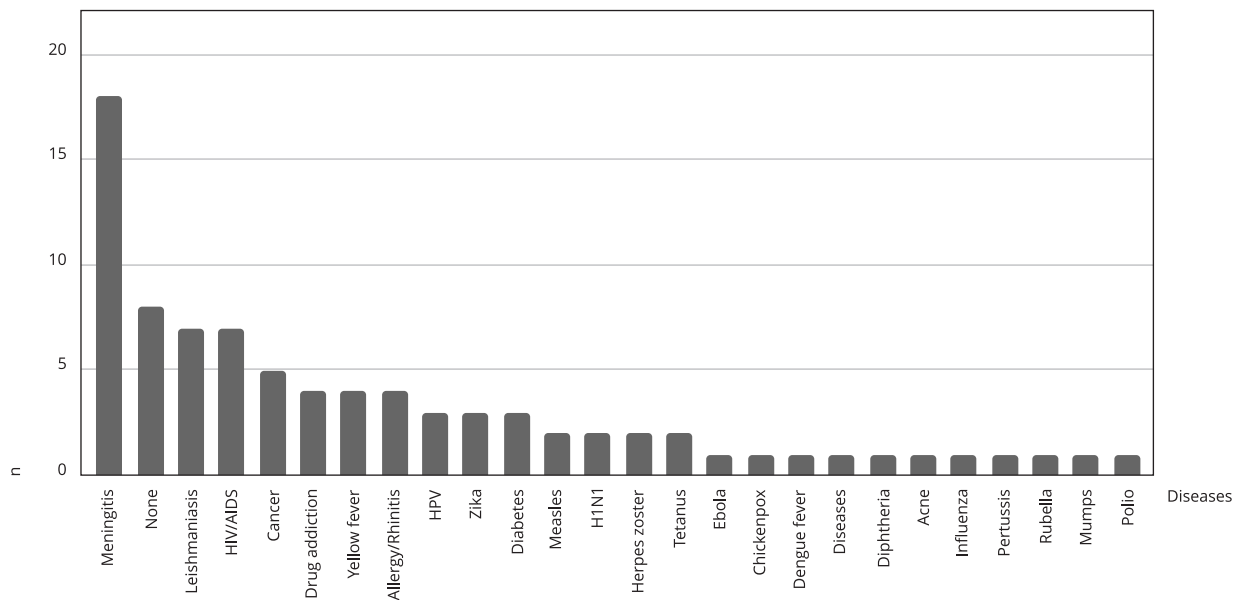
vaccines", i.e., preparations for persons already diagnosed with a given disease to improve their immune response. There were 21 links on vaccines to treat diseases such as HIV/AIDS, diabetes, cancer, and allergic rhinitis. Of the 12 fake news stories that were identified, seven generated misinformation on influenza vaccines (58.3%), two on meningitis (16.7%), two on cancer (16.7%), and one on yellow fever (8.3%).

As for position, 78 texts were classified as pro-vaccination (87.6%) and eight as anti-vaccination (9%). Three were classified as metaphoric (3.4%) since they referred to vaccines figuratively (Figure 3).

As for veracity, 72 texts were classified as true information (80.9%) and 12 as fake news (13.5%). This division did not apply to five links: the three metaphoric cases (3.4%) and two contents defined as entertainment (2.2%): a scene from a soap opera on *Rede Globo* and a comedy video on *Porta dos Fundos* in YouTube (Figure 4).

As mentioned, the types of vehicles were categorized as professional and non-professional sites. This categorization allowed identifying the main sources of information for users in the context of the debate on vaccines. As said before, professional vehicles were defined for this study's purposes as those with a clearly identifiable editorial policy, with a physical address, identifying the texts' authors, and citing the sources. The 89 collected links referred to a total of 63 online vehicles, of which 45 were classified as "professional". Of these, there were 24 news vehicles, ten "information and/or varieties" sites, three blogs, three sites belonging to health education institutions, two specialized in factchecking, two in entertainment, and one in e-commerce (Figure 5).

Among the news vehicles, there were eight portals (*G1, Magg, Paraná Portal, Portal do Amazonas, R7, SOL, Último Segundo,* and *UOL*); six magazines (*Cães & Gatos, Claudia, Crescer, Exame, Galileu,* and *Superinteressante*); six newspapers (*Estado de S. Paulo, Folha de S.Paulo, Gazeta do Povo, O Globo, O Tempo,* and *Zero Hora*); one news agency (*BBC Brazil*); one TV channel (*History Channel*); and one radio station (*GMC*, from Maringá).

The sites categorized as "information and/or varieties" were those that produced contents on vaccines that do not necessarily fit what has been defined historically as the "news" genre, i.e., the narrative reconstruction of social facts, selected on the basis of "deviation" and "social significance" and submitted to journalistic production processes and professional values such as objectivity,

Figure 3

Positions towards vaccination in the texts generating the heaviest traffic in social networks from May 2018 to May 2019, containing the keyword "vaccine".
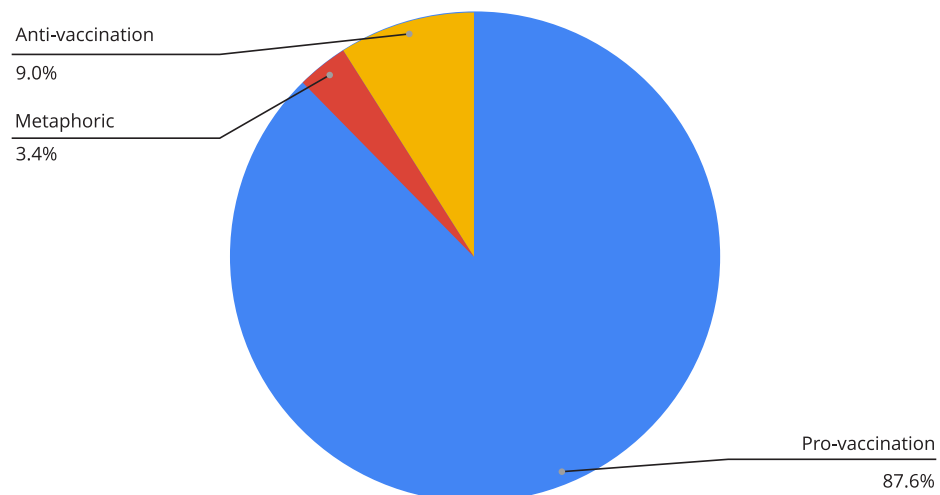
Figure 4

Assessment of the veracity of the content in the texts generating the heaviest traffic in social networks from May 2018 to May 2019, containing the keyword "vaccine".
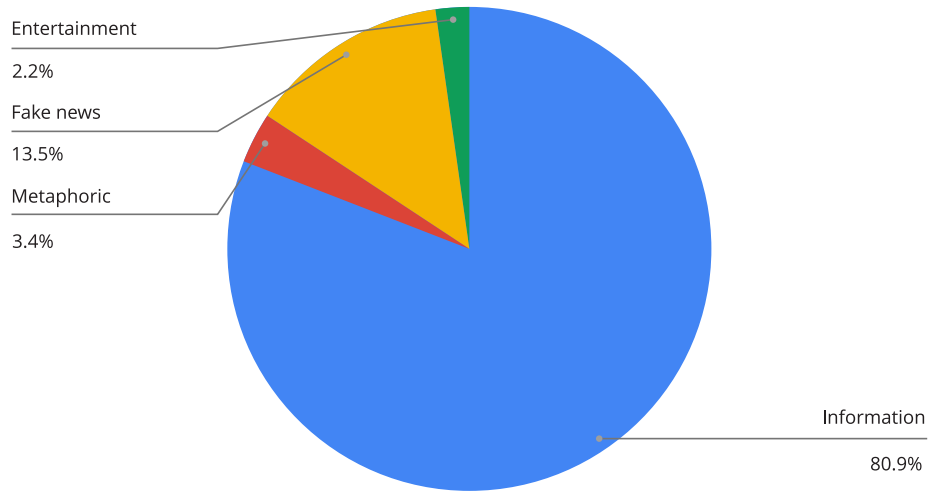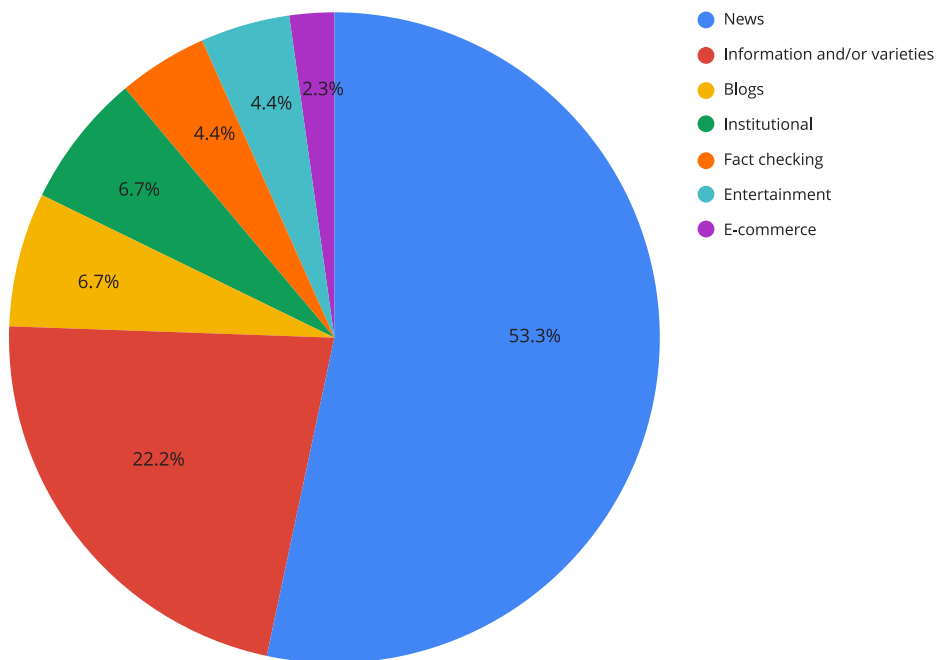

Entertainment
2.2%
Fake news
13.5%
Metaphoric
3.4%
Information
80.9%

Figure 5

Categorization of the types of professional vehicles found in the texts generating the heaviest traffic in social networks from May 2018 to May 2019, containing the keyword "vaccine".

- News
- Information and/or varieties
- Blogs
- Institutional
- Fact checking
- Entertainment
- E-commerce

53.3%
22.2%
6.7%
6.7%
4.4%
4.4%
2.3%

independence, autonomy, veracity, impartiality, etc. [28,29,30]. Such sites are thus the result of individual or collective initiatives which may be intended to inform, but which do not clearly separate fact-reporting from opinion and are not based on journalistic criteria of newsworthiness. They include a variety of approaches, models, and formats. There are sites featuring religious content (*Vatican News*); health (*Saúde Popular*, *Psicologias do Brasil*, and *Bebê Mamãe*); tips and advice (*Dicas Online*, *M de Mulher*, and *Elos.com.vc*); and commentary with a personal angle on current affairs (*ContiOutra*, *Geonotícias*, and *Portal do Holanda*).

Only three links were for sites from academic/scientific institutions, one from the medical field (Abrasco) and two from the educational field: *Jornal da USP*, affiliated with the University of São Paulo, and *TVTEC Jundiaí*, a public polytechnic school specialized in audiovisual production.

The non-professional sites, or those with no information on authorship, staff, editorial policy, address, or sources of their contents, totaled 18 vehicles. As mentioned, we are not making a value judgment, but attempting to identify their work processes and presence on social networks. Without information on the criteria orienting their publication, it is difficult to attest to the contents' accuracy and quality. Of these webpages, nine were propagating fake news about vaccines.

Discussion

The data analysis identified important trends, dynamics, and contradictions in the public debates on vaccination in the social networks. Subjects connected to scientific research in health carried major weight in the user traffic. Still, most of the interactions on this topic occurred mainly in news vehicles and varieties sites, with only a small share of academic and scientific institutions. Besides, the links with the heaviest traffic did not include webpages of government agencies in the areas of health and science and technology, such as ministries, regulatory agencies, municipal and state health departments, government research agencies, etc. That is, one can conclude that there is social interest in new and emerging vaccines, but that the communication produced by academic and scientific institutions plays a limited role in this communication.

There is also strong interest in the issue of "therapeutic vaccines". Diseases such as HIV/AIDS, cancer, and diabetes spawned more traffic than vaccine-preventable diseases, even those that have experienced growth in the number of cases, like measles. In addition, a case involving the family of a prominent public figure – former President Lula – helped leverage the debate on a specific subject, meningitis.

The significant predominance of the position in favor of vaccines shows that the discourses based on the principle that vaccination is safe, effective, and necessary produced more traffic than the opposite view. In these texts, vaccines are associated with scientific progress and the benefits they bring to the population. The presence of the category metaphor, although with a small percentage, illustrates how the word vaccine is used as a synonym for prevention and fight (against disease), indicating the widespread basic knowledge of this technology and its incorporation into the social imaginary.

Although fewer in number, the eight texts with the position against vaccines were among the hundred most popular links in social networks, so it is important to understand how vaccination is approached in these discourses. Seven of them were fake news stories, confirming that the anti-vaccination discourse proliferates mainly in the terrain of false information. Six referred to the case of a 14-year-old girl who had supposedly become pregnant after receiving the influenza vaccine in a clinic in the United States. This case appeared in half of the links classified as fake news. The texts essentially repeat the same information: a young girl in perfect health presents strong symptoms such as fever and nausea following immunization, and tests then show she is pregnant. She claims she has never had sexual intercourse, and her condition is verified by a physician, who confirms the vaccine as the cause of her pregnancy.

Three of six texts included a section on "vaccine pregnancy", presenting purportedly scientific sources, similar cases, and statistics. The information was backed by a supposed scientist and the United Nations, which was supposed to have found that four women were becoming pregnant every year as a result of vaccination. Finally, the text cited a case in 2013, in Mexico, in which 11 girls

became pregnant because of a contaminated batch of HPV vaccine, allegedly confirmed by Mexican health authorities.

As postulated by discourse analysis, the choice of words and enunciation strategies is not random, but responds to the social context in which the text was produced and the ideological intentions permeating this scenario. First, this reinforces the idea of a person in perfect health who is vaccinated and then develops symptoms of disease. Second, it is not just any individuals, but girls, children and adolescents who should have been protected by the health authorities, but who were exposed to contaminated batches. Finally, there is an appeal to the scientific community to stop sidestepping this controversial subject in order to prevent this tragic situation from repeating.

The text reinforces a view contrary to vaccination, spreading common fears among part of the population that partly or completely doubts the safety and efficacy of vaccines: the side effects, the authorities' negligence, and scientists' partiality. Combined, these elements put healthy individuals at risk, especially children. In the context of HPV vaccination in Brazil, for example, the vaccine was viewed by anti-vaccination groups as an irresponsible imposition by authorities on their daughters, exposing them to dangerous side effects (hidden by scientists) and an early incentive to sexuality [7]. Not by coincidence, the text combines fake news on the HPV vaccine with fake news on pregnancy in a virgin girl, an extreme effect suffered by a defenseless adolescent, resulting from an unsafe attempt to prevent a supposedly harmless disease, influenza.

Among the seven fake news stories in the position against vaccination, another text refers to influenza immunization. The text quotes U.S. President Donald Trump as purportedly saying that "*the flu vaccine is the greatest fraud in the history of medicine*", engineered by the pharmaceutical industry to make money. This ploy again underscores vaccine as an ill that can make healthy, defenseless persons sick, in the face of self-serving authorities and scientists, which also produces a view of science as partial and dangerous. Although such texts were fewer in number, we should not overlook the possible effects of the reverberation of anti-vaccination discourses in the online environment and their influence on the propagation of anti-science attitudes.

A true news story that communicated a view contrary to vaccination was, *Boy Who Died After Receiving Tetanus Vaccine Told His Mother He Was Feeling Sick*, from the information site *Mãe Tips*. The enunciation strategies raised doubts on vaccines' safety and the reliability of scientists and health authorities. According to the text, the case occurred in a private clinic in the state of Paraná, Brazil, in a 12-year-old boy who felt sick, and where the doctor had stated that the symptoms were a reaction to the vaccine. The mother reported that her son began to choke and foam at the mouth (severe and immediate reactions to the injection). The story reported that the case was under investigation and included a press release by the State Health Department, alleging that a switch of medications had caused the death.

Although the story does not state categorically that the vaccine was the cause of death, this interpretation is possible, especially based on the title. In a contemporary scenario in which users' attention is disputed by a huge volume of information on social networks, information often recirculates without being completely consumed. In other words, the content is often shared after reading only the title appearing on Twitter and Facebook, without the link even having been accessed, especially when the title confirms previously held beliefs and opinions. This practice can generate a partial or mistaken understanding of the information circulating on the web [31].

Among the 12 fake news stories identified, five took a position in favor of vaccines. Some of their discursive elements reveal problems in the relationship between society, science, and public health. One of them is *Cuba Produces Cancer Vaccine: More Than 4,000 People Have Been Cured By It!*, in the blog *Papo Reto*. Although the text includes true information on the development of immunotherapy for lung cancer, the title categorically claims that the disease was cured by the vaccine. The body of the text explains that the drug actually improved patients' symptoms and prolonged their survival. We thus considered this fake news, since the sensationalist headline makes a false claim for political purposes: the story extols Cuba as representing a "science for the good".

The choice of this expression suggests its opposite, "Big Pharma". Again, this approach produces the idea of a science of evil, which could potentially cure populations but fails to do so because it is oriented by financial interests. Although vaccines are viewed as positive, the processes of this technology's production and distribution by the pharmaceutical industry, health providers, governments, and

scientists with evil intent are viewed as negative. This discourse can hinder the population's adherence to vaccination campaigns, necessarily mediated by these agents.

Two other fake news stories took a positive view of public policies for vaccination. The stories' title is the same: *SUS Now Offers Meningitis Vaccine for Children*. What actually happened was the expansion of coverage (previously up to five years of age) to include children over five with risk factors. The subtitle *Ruling Published in the Federal Register This Wednesday; Former President Lula's Grandson Died of the Disease Last Friday*, associates the event with political motives, producing another meaning that can lead to distrust towards the actors involved in the production and distribution of vaccines.

The same issue also appears in the fake news story, *Lula Vetoed Meningitis Vaccine in 2010; The Disease Killed His 7-Year-Old Grandson*. According to discourse analysis, enunciates should not be understand out of context, but within a discursive field [25]. Circulating at the same time, such fake news stories fabricate a social scenario in which vaccination is ruled by unreliable authorities who (it is insinuated) subjected thousands of children to an avoidable disease, a scenario that only changed after one of their own loved ones was stricken. Besides the fact that meningitis was not the cause of death (the former President's grandson died in March 2019 due to sepsis involving *Staphylococcus aureus*), Lula had only vetoed a bill providing the inclusion of the meningococcal C conjugate vaccine, since it was already part of the basic vaccination calendar.

The popularity of such discourses also suggests the population's ignorance of the set of vaccines offered by the SUS. Not knowing that vaccines can be obtained free of cost and distrusting the public vaccination process can alienate part of the population from this practice, preventing them from acknowledging immunization as a basic right.

Another fake news story, the only one published in a professional site (*Paraná Portal*), refers to a victim of yellow fever who had supposedly signed a waiver refusing to take the vaccine. This information, present in the headline, appears in the body of the text in an interview with the director of the 1st Regional Health Division in Paranaguá, Paraná State. We contacted the agency and confirmed that the information is false. The story uses the case to reinforce the importance of vaccination in the context of a yellow fever epidemic. However, it is impossible to say whether there was an error in factchecking or deliberate production of fake news.

Finally, when jointly discussing the results on positions and the veracity of links, it is necessary to reflect on the presence fake news and anti-vaccination discourses in the most widely shared links in 2018 and 2019. On the one hand, the predominance of true information and pro-vaccine discourses emphasizes that vaccination is still mainly viewed as beneficial and necessary, and that social networks provide an important contemporary source of scientific information, with potential to be explored to expand participation and access to scientific knowledge.

Meanwhile, there is no contradiction in the smaller volume of discourses against vaccination among the links with the heaviest traffic in a context of a growing anti-vaccination movement. Rather, this highlights the need to develop hypotheses for new research efforts. One such hypothesis is that this movement does not act mainly in the public spaces of Facebook and Twitter, but in other media environments such as closed groups in Facebook and WhatsApp. In these private spaces, the criteria for veracity are dictated by the group's own dynamics, avoiding traditional information sources like media outlets and academic, scientific, and political institutions. all backed by the community itself as the space for mediation of reality.

In addition, even in spaces analyzed by BuzzSumo, one should consider the role of echo chambers or filter bubbles, which emerge when algorithms applied to online content selectively measure what users wish to see based on their profile, links, and navigating history. Repetition of the same information prevents these users from being exposed to other positions, fueling polarized views and criteria of veracity limited to these spaces [15]. It is necessary to create alternatives to burst these bubbles, promoting the population's broad access to high-quality scientific information.

Final remarks

The study allowed identifying the dynamics of online traffic in the debate on vaccines in social networks. There was a predominantly positive position towards vaccines, even in a context of growing

antivaccination discourses. The study also showed strong interest by users in subjects connected to scientific research, even though the main sources for such information were not research and development institutions. In addition, the presence of fake news raises a warning flag about the role of misinformation in social networks. Fake news signals both the discredit in the safety of vaccines and an association with certain political biases. Meanwhile, the simultaneous presence of stories resulting from factchecking among the sites with the heaviest traffic indicates that a concern with veracity is present in online chat networks. Finally, the study intended to contribute to the development and improvement of communication strategies for accessing and qualifying the debate on vaccines' safety and efficacy.

Contributors

L. Massarani was responsible for the overall research proposal on vaccines and social networks and participated in this specific study's methodological design, besides supervising and orienting the study and writing the article. T. Leal participated in this particular study's methodological design and was responsible for the data collection, analysis, and interpretation and writing the article. I. Waltz contributed to the data analysis and interpretation and writing the article.

Additional informations

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Resumo

Esta pesquisa busca investigar o engajamento e as interações nas redes sociais sobre as vacinas. Com base na coleta dos 100 links mais compartilhados, curtidos e comentados entre maio de 2018 e maio de 2019, por meio da palavra-chave "vacina", foram identificadas os principais assuntos, fontes e posicionamentos. Em uma etapa qualitativa, foi empregado o método da Análise do Discurso para identificar os modos de produção de sentido em torno dos quais as conversações em rede se concentraram. Foi estudada ainda qual a participação das fake news entre os links mais compartilhados. Os resultados apontam que há majoritariamente uma disposição pró-vacina (87,6%) e um forte interesse em temas ligados à saúde, ao desenvolvimento científico e às políticas de saúde. Por outro lado, parte das fontes de informação mais acessadas pelos brasileiros não traz informações sobre critérios editoriais, políticas ou autores, o que pode dificultar a apreensão da qualidade e veracidade das informações consumidas. Além disso, as fake news representaram 13,5% dos links com maior engajamento, o que indica um dado preocupante em relação à desinformação sobre as vacinas. Esses resultados indicam importantes dinâmicas de comunicação sobre as vacinas e oportunidades para a melhoria na comunicação pública em torno do tema.

Vacinas; Rede Social; Comunicação e Divulgação Científica

Resumen

El objetivo de esta investigación es investigar la participación activa y las interacciones en las redes sociales sobre las vacunas. En base a la recogida de los 100 enlaces más compartidos, con "me gusta", y comentados entre mayo de 2018 y mayo de 2019, mediante la palabra-clave "vacuna", fueron identificados los principales asuntos, fuentes y posicionamientos. En una etapa cualitativa, se empleó el método del Análisis del Discurso para identificar los modos de producción de sentido, alrededor de los que se concentraron las conversaciones en red. Asimismo, se estudió cuál es la participación de las fake news entre los enlaces más compartidos. Los resultados apuntan que existe mayoritariamente una disposición pro-vacuna (87,6%) y un fuerte interés en temas relacionados con la salud, con el desarrollo científico y las políticas de salud. Por otro lado, parte de las fuentes de información más consultadas por los brasileños no proporcionaron información sobre criterios editoriales, políticas o autores, lo que puede dificultar la aprehensión de la calidad y veracidad de la información consumida. Asimismo, las fake news representaron un 13,5% de los enlaces con mayor participación, lo que indica un dato preocupante respecto a la desinformación sobre las vacunas. Estos resultados indican importantes dinámicas de comunicación sobre las vacunas y oportunidades para una mejora en la comunicación pública en torno a este tema.

Vacunas; Red Social; Comunicación y Divulgación Científica