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Revisiones

Use of twitter for health communication: a systematic review

Uso de twitter en la comunicación en salud: una revisión sistemática

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Abstract

Introduction: Social media have become one of the leading health communication channels among the exponents of Health 2.0. Twitter has particularly noteworthy features for providing information quickly and easily. However, there is still controversy about the convenience of its use. **Objectives:** This paper aims to identify the main topics of health covered, the uses of Twitter in health communication and to characterize the valences (positive and negative) associated with each use. **Methodology**: To do that, we conducted a systematic review following PRISMA guidelines. Two databases (Web of Science and Pubmed) were searched, and 610 articles were retrieved. After removing duplicates, screening the titles and abstracts and assessing the full texts, 83 papers met the inclusion criteria. **Results**: The review identified five uses of Twitter: Conversation, Engagement, Information, Prevention, and Awareness, and it established the definitions of the positive and negative valences associated with each use. The most common uses found were Conversation and Engagement. Likewise, the two areas most studied were Public Health and Infectious Diseases. **Conclusion**: There is no consensus on the usefulness of Twitter as a tool for information or for generating debate, although the platform's effectiveness for measuring the impact of health campaigns was highlighted.

Key words: Health communication; social media; Twitter; prevention; engagement; public health; infectious diseases.

Resumen

Introducción: Las redes sociales se han convertido en uno de los principales canales de comunicación sanitaria 2.0. En concreto, Twitter tiene características particularmente significativas para brindar información de manera rápida y sencilla, sin embargo, aún existe controversia sobre la conveniencia de su uso. **Objetivos:** Identificar los principales temas de salud tratados, los usos de Twitter en la comunicación en salud y caracterizar las valencias (positivas y negativas) asociadas a cada uso. **Metodología:** Revisión sistemática siguiendo las directrices PRISMA en las bases de datos (Web of Science y Pubmed). Se recuperaron 610 artículos, de los cuales analizamos 83 que cumplían con los criterios de inclusión. **Resultados:** La revisión identificó cinco usos de Twitter: Conversación, Compromiso, Información, Prevención y Conciencia, y estableció las definiciones de las valencias positivas y negativas asociadas a cada uso. Los usos más comunes encontrados fueron Conversación y Compromiso. Asimismo, las dos áreas más estudiadas fueron Salud Pública y Enfermedades Infecciosas. **Conclusión:** No hay consenso sobre la utilidad de Twitter como herramienta de información o de generación de debate, aunque se destaca la efectividad de la plataforma para medir el impacto de las campañas de salud.

Palabras clave: Comunicación en salud; medios de comunicación sociales; Twitter; prevención; *engagement*; salud pública; enfermedades infecciosas.

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Introduction

Social media play an increasingly crucial role in various fields, and the health sciences are no exception. Social media networks provide spaces where interpersonal relationships can be developed and, simultaneously, information can be sought, and content can be created and shared with users.

Social media have become one of the leading health communication channels among the exponents of Health 2.0, the different tools of Web 2.0 for distributing information on health (Andersen et al., 2019). Among other uses, patients, professionals, and health organizations seek to harness the features of social media platforms to disseminate or share information of interest, contact other users, discuss health issues, or seek advice (Zhang, Gotsis, & Jordan-Marsh, 2013).

At the same time, social media networks constitute one of the prime sources of health information, with 70% of Spaniards using the internet for this purpose. Moreover, during the COVID-19 pandemic, searches on SARS-CoV-2-related issues were the second most frequent after those related to vaccines (Eurostat, 2021).

Likewise, medicine and health-related issues are of most interest to citizens (68%), and a third of the population turns to social networks for information on these two areas (FECYT, 2022).

Hence, social networks have enormous potential in the health field (Sendra-Toset & Farré-Coma, 2016), as much for connecting, sparking debate and creating synergies between health professionals, citizens, patient associations and the media (Cuesta-Cambra; Martínez-Martínez & Niño-González, 2019) as for disseminating information quickly or dealing with crisis situations (Yoo, 2019). In this context, Twitter, one of the most widely used social media networks, has particularly noteworthy features for the health field for its ability to reach a range of stakeholders quickly and easily, provide information about the public's response to a given message, and therefore help to implement health information campaigns (Pretorius, Mackert, & Wilcox, 2018).

In this regard, Twitter is considered the social network of reference in health, as institutions and professionals in this field use it twice as much as other networks, such as Instagram (Busto-Salinas, 2019).

Hence, we performed a systematic review of the literature on Twitter and health communication, focusing mainly on the uses made of Twitter, the valences associated with each use, the audiences, the fields and topics of health, and the features of the studied tweets.

Previous systematic reviews have been carried out on health communication and social media on matters including uses, benefits, and limitations (Moorhead et al., 2013), public discourses about marijuana (Park & Holody, 2018), promotional communications for influenza vaccination (MacDonald et al., 2013), Ebola virus (Fung et al., 2016) breast cancer (Falisi et al., 2017), uses among health professionals (Chan, & Leung, 2018), health-related disasters (Eckert et al., 2018), parental use of social media to influence infant and child health (Pretorius, Johnson, & Rew, 2019), the effects of branding on physical activity (Lithopoulos, & Rhodes, 2020) or the process of communicating cancer-related genetic risk information with patients (Hong, 2020).

Twitter itself has been studied to ascertain its usefulness in university-based healthcare education (Smith, & Lambert, 2014) as a tool for health research (Sinnenberg et al., 2017) or coding tobacco-related data (Lienemann, Unger, Cruz, & Chu, 2017).

However, to our knowledge, no systematic review has been undertaken on how Twitter is used in health communication. Consequently, this systematic review constitutes a breakthrough since it delves into the characteristics that differentiate Twitter, the most widely used social network in the health field, from other networks concerning uses, user profiles analyzed and areas of health studied, among others. The review also proposes possible new lines of research in this field.

This paper presents the main results of our systematic review, which sought to answer the following research questions:

1) What are the primary uses of Twitter in the field of health communication and the valences linked to these uses?

2) On what type of users do studies on Twitter and health communication focus?

3) To what general areas and specific health topics do the studies analyzed refer?

Methodology

We conducted a systematic review following Standard Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page et al., 2021) guidelines (Figure 1). A keyword search was executed in two databases (Web of Science Core Collection and PubMed).

These two databases were chosen for their relevance: Web of Science as a global standard in the field of research in general (AlRayat, Malkawi & Momami, 2019), and Pubmed in healthcare (Yeung, 2019). The terms "health communication" AND "social media" OR "social network" OR "Twitter" were used to search titles, abstracts, and keywords. The search identified 610 articles. The removal of duplicates left 340 papers that the researcher reviewed by hand.

Two reviewers independently screened the titles and abstracts of the studies. As a result, 210 papers were

excluded. The reviewers then independently assessed the full texts of the 130 papers retrieved. Of those, 47 studies were excluded after careful review. The 83 studies not excluded at that second-round screening stage were included for review. Disagreements were discussed and adjudicated by consensus. The k score between 2 coders for a 10% sample for study inclusion was 0.8. See Figure 1 for the search strategy process.

Inclusion and exclusion criteria

The inclusion criteria were as follows:

- The paper was about Twitter and health communication;
- The paper mentioned a specific health topic, at least one target or use of Twitter, or the target audience;
- Twitter was used by researchers to obtain at least part of the results;
- The papers were published in peer-reviewed journals.

The exclusion criteria were as follows:

- The paper was about health communication but not about Twitter.
- The paper was about Twitter but not about health communication.
- The paper was not published in a peer-reviewed journal (e. g., conference proceedings).
- Abstracts, editorials, and review articles were also excluded.

Search strategy

The systematic review followed the PRISMA guidelines. A keyword search was executed in two databases (Web of Science Core Collection and PubMed). The terms "health communication" AND "social media" OR "social network" OR "Twitter" were used to search titles, abstracts, and keywords. The search identified 610 articles. The removal of duplicates left 340 papers that the researcher reviewed by hand.

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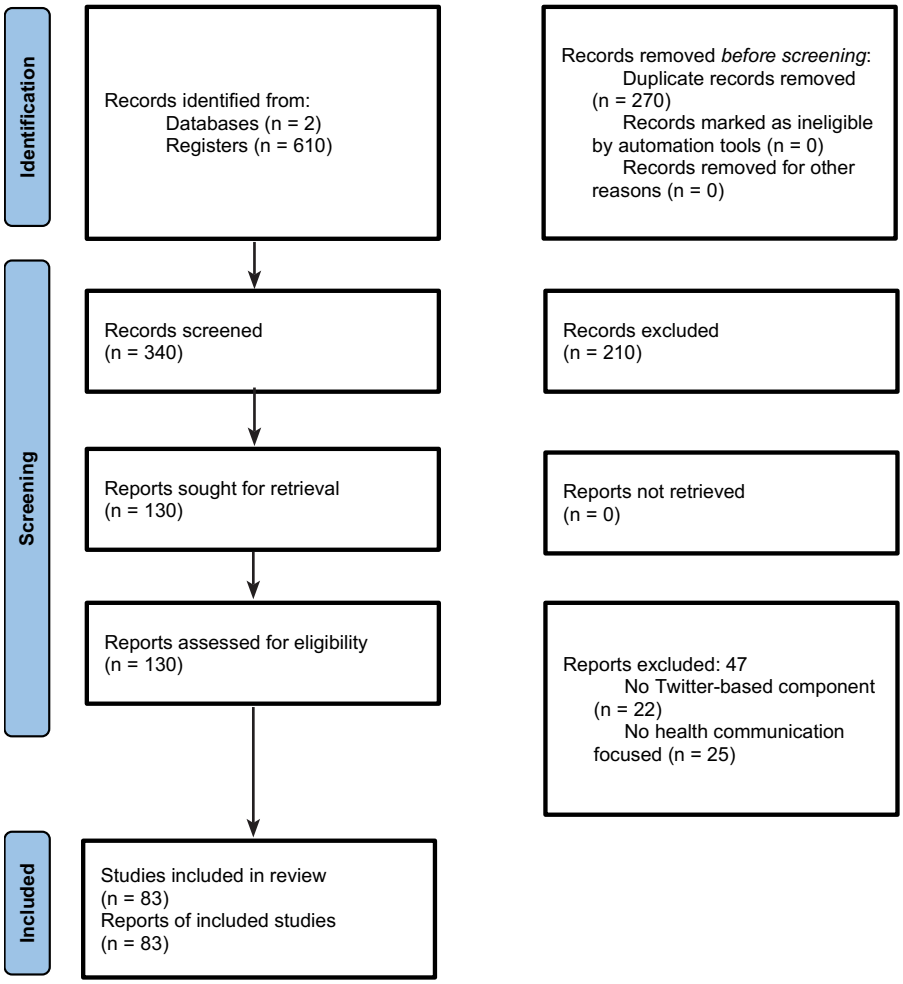

Figure 1. Systematic literature review screening process.

Coding

This study reports results in the following areas: audiences, uses, and valences; critical features of the tweets, general and specific health topics, methodology, main conclusions, sample size, country/countries, and time frame.

Results

Five main uses of Twitter were identified: Information, Conversation, Prevention, Awareness, and Engagement. We also characterized the positive and negative valences associated with each use, shown in Table 1.

Thus, the chief difference when using Twitter to provide health information was whether that information could be considered reliable (Albalawi & Sixsmith, 2017; Andersen et al., 2019) or whether a further professional intervention would be needed to improve it (e.g., Mahoney et al., 2015; Van der Tempel et al., 2016).

Several positive uses were identified regarding conversation, which could foster public debate and enable the identification of topics of interest and new narratives about health problems (Radzikowski et al., 2016; Nawaz et al., 2017 or Glowacki et al., 2019). Another use in this context was to improve communication in health emergencies or exceptional health situations (Da'ar et al., 2017; D'Agostino et al., 2017; Lazard et al., 2017, among others). Similarly, communication via Twitter could help improve patient-provider communication (Alpert & Womble, 2016) or patient-to-patient communication through the creation of support networks (Villa, Ocampo & Cicero, 2012; Myrick et al., 2016).

Table 1. Valences associated with the uses of Twitter in health communication.

Use of Twitter	Positive valence Description	Negative valence Description
Information	Provides a reliable source of health information.	Requires more intervention by health professionals to disseminate better quality information.
Conversation	Encourages fluid, two-way communication (practitioner/ patient, patient/patient), public debate in exceptional health situations	One-way message that does not encourage dialogue between different actors or debate in an exceptional health situation.
Prevention	Contributes effectively to the promotion of healthy behaviors	Does not contribute to the promotion of healthy behaviors
Awareness	Contributes to raising visibility or awareness of specific health problems or prevalences	Continues to under-represent or make specific health problems or prevalences invisible.
Engagement	Allows evaluation of communication actions through Twitter and identification of the characteristics of the most effective messages	Twitter is not a useful tool for assessing the effectiveness of actions

At other times, the use of these messages was negative, as they did not encourage dialogue (Thackeray et al., 2012; Rabarison et al., 2017; Tougas et al., 2018). This revealed a different use of Twitter depending on the user profile (Antheunis, Tates & Nieboer, 2013), or it did not contribute to improving communication in healthcare situations (Vos & Buckner, 2016).

Regarding prevention, this review found studies on the importance of this social media platform in preventing the incidence of disease by promoting healthy behaviors (Albalawi & Sixsmith, 2015; Massey et al., 2016, among others), although there was also one paper noting that the perception of risk depended on the type of communication and the social media network through which the information is disseminated (Yoo, 2019).

The studies on engagement, understood as the possibility of evaluating the communication actions disseminated through this Twitter, always did so with a positive valence. Therefore, these studies focused on identifying the main features of tweets with the most significant impact to propose future health communication strategies by replicating the tone or characteristics of the most viral messages (Albalawi & Sixsmith, 2017), thus maximizing the effectiveness of the actions (e.g., Lee & Sundar, 2013; Vraga et al., 2018).

Finally, in terms of awareness, the studies distinguished between communication that contributes to the visibility of stigmatized health problems (Schwartz & Grimm, 2017), raising awareness of the prevalence of a disease (e.g., Teoh, 2018; Househ, 2016), or the use of preventive treatments (Lutkenhaus, Jansz & Bouman, 2019), and communication that continues to under-represent or make invisible these aspects (Lama et al., 2018; O'Hanlon, 2019).

As Table 2 shows, the conclusions centered on the conversational use of Twitter were the most frequent (36%) and have a high presence of positive (36.4%) and negative (37%) valences. Despite some studies concluding that the one-way nature still predominates, 70.6% of the findings on this area show that Twitter was useful in fostering two-way communication on health issues.

In terms of positive valences, most of the papers highlighted the platform's potential for measuring engagement (42.4%). Specifically, the studies analyzed or evaluated the aspects of the message that were most effective in promoting engagement among the target population; in short, they focused on the use of Twitter as a tool for measuring communication actions mainly by different health institutions or organizations in order to identify the most effective ones in terms of interactions (Table 1 and 2).

Similarly, 48.1% of the papers with negative valence conclusions referred to the unreliability of the health information disseminated via Twitter and the importance of more intervention by health professionals to improve the quality of the information disseminated.

As for the target audience, 59 papers focused on the general public. The second most studied group was health professionals (21 papers), while patients were the group that receives the least attention (8). Only 5 studies analyzed more than one group, specifically health professionals and patients.

As for the topics, the most commonly studied health specialties were Public Health (36.1%; n=30), Infectious Diseases (25.3%; n=21), and Oncology (16.9%; n=14) (Table 3).

Table 2. Uses and valences of Twitter in health communication identified in the conclusions of the papers reviewed.

Use of Twitter	Positive valence		Negative valence		Total	
	No	%	No	%	Nº	(%)
Conversation	24	36.4	10	37	34	36
Engagement	28	42.4	0	0	28	30.1
Information	2	3	13	48.1	15	16.1
Prevention	8	12.1	1	3.7	9	9.7
Awareness	4	6.1	3	11.1	7	7.5
Total	66	100	27	100	93	100

Table 3. Common research health topics for the included papers (2009-2019).

Research field	n (%)	Description
Pneumology	1 (1.2)	Respiratory diseases
Public health	30 (36.1)	Affordable Care Act, health organizations, obesity, pet exposure, sexual health, transgender health, vaccination
Infectious Diseases	21 (25.3)	Antibiotics, cholera, Ebola, enterohemorrhagic Escherichia coli, HIV, influenza, measles, Zika.
Oncology	14 (16.9)	Cancer, breast cancer, prostate cancer, cervical cancer, kidney cancer, testicular cancer, PHV.
Neurology	1 (1.2)	Brain Injury
Psychiatry	4 (4.8)	Anorexia, bipolar disorder, depression, drug abuse, emotions, marijuana, mental health, obsessive-compulsive disease, schizophrenia, stimulant use, suicide
Obstetrics and gynecology	1 (1.2)	Abortion, reproductive and sexual health,
Cardiology	1 (1.2)	Heart disease
Pediatrics	2 (2.4)	Pediatric obesity, health literacy, sudden infant death syndrome
Dentistry	1 (1.2)	Dental care, Dental pain, orthodontics
Behavioral medicine	7 (8.4)	Nutrition, physical activity, sleep disorders, smoking, weight loss, e-cigarettes.

The most studied topics within these areas were Tobacco/e-cigarettes (n=7; 8.4%), Cancer (n=7; 8.4%), Vaccinations (n=7; 8.4%) HPV (n=6; 7.2%), and HIV (n=4; %).

Regarding methodology, content analysis was the most commonly used. Different types of software were routinely used to automate the analysis. This type of automated content analysis was based on data mining and uses programs such as SAS Text Miner, NodeXL, NCapture, NVivo, or Topsy, among others (e.g., Myrick et al., 2016). Many of these studies used machine learning methods and models for content analysis, often using clusters, allowing the grouping of tweets by topic or other variables. Often, part of the data analysis process in these studies was performed manually (Martínez et al., 2018).

On the other hand, we found studies that favoured qualitative content analysis (Bravo & Hoffman-Goetz, 2016) or both types (quantitative and qualitative) (Broniatowski et al., 2018). Another methodology used was cross-sectional analysis, which allows for cross-sectional studies of Twitter accounts (Andersen et al., 2019). Some authors also used online surveys (Yoo, 2019), laboratory studies of a group of users (Spence et al., 2015), or semi-structured interviews (Alpert & Womble, 2016).

Regarding the sample, the most studied content was tweets, although some research also analyzed Twitter accounts (Albalawi & Sixsmith, 2017) or user opinions (Yoo, Kim & Lee, 2018). While most of the papers analyzed text, the next most studied aspect was valences. Other aspects (hashtags, number of followers, mentions, etc.) appeared much less frequently. Thus, the quantitative measurement of interactions was mainly analyzed in papers on the use of Twitter to check engagement.

The sample size constituted a highly heterogeneous field, and each study had a specific sample size that does not match any other. As noted, among the quantitative analyses that used automated techniques, we found samples including a high number of tweets, even millions of messages (D'Agostino et al., 2017). In contrast, the sample size was significantly smaller in studies where qualitative or mixed methodologies were used (Mahoney et al., 2015).

As for the countries where the research was focused, almost half of the papers did not refer to any specific country, as the impact of Twitter on different topics was studied using hashtags, mainly in English, which have a global reach (Massey et al., 2016). In studies that did refer to a specific country, the United States most frequently arised (Chung, 2016). Other countries cited were Canada, the United Kingdom, Saudi Arabia, the Netherlands, South Korea, Spain, Mexico, Russia, South

Africa, and Madagascar. Very few studies undertook multi-country comparative studies.

The papers revealed a great deal of heterogeneity in the time frame in which the study was conducted, ranging from those that address tweets posted over several years (Adnan et al., 2019) to others analyzing messages posted within a day (Fung et al., 2018). In between, there were many studies analyzing content posted over several months or weeks (Yuan, Schuchard & Crooks, 2019).

Discussion and conclusions

While the main findings highlight the usefulness of Twitter in fostering two-way communication and public debate, many of the reviewed papers remarked the need for more intervention by healthcare professionals to improve the quality of the disseminated information. This implies that Twitter can be a helpful tool, less as a source of information on health issues and more to identify social concerns and information needs about a specific topic. Accordingly, compared with previous reviews, the increased presence of conversation and the use of the social media platform to measure engagement with information is a novelty (Moorhead et al., 2013).

The characterization of the positive and negative valences of each use marks an important innovation with respect to previous studies addressing these aspects, but without exploring them in great depth (Sinnenberg et al., 2017). Moreover, given the strong presence of this element in the analyzed studies, the definition of the positive valences of the different uses constitutes a potential area for future research in which each one should be studied not in isolation but in relation to the uses of Twitter.

Similarly, the general public as the most analyzed group marks a significant difference from previous studies (MacDonald et al., 2013). However, this finding does concur that most studies focus on a single specific audience segment (Falisi et al., 2017). In addition, only five papers analyze health professionals and patients simultaneously. Given the dearth of comparative studies, this is a line that merits exploration as the few studies on this area show differences in the uses of social media networks made by professionals and patients and, in general, by various groups (Antheunis, Tates & Nieboer, 2013; Hong, 2020).

The most studied specialties are in line with the results of previous systematic reviews (Sinnenberg et al., 2017). Public Health and Infectious Diseases feature most frequently. It is also significant that the diseases with the highest mortality (WHO, 2021), such as cardiovascular and pulmonary diseases, and respiratory infections, are under-represented. Despite the considerable diversity of health topics, those related to controversial treatments, such as e-cigarettes or vaccines, are the most recurrent. This indicates that research on Twitter in this area has focused on its use as a tool for monitoring these types of issues to identify information needs.

One of the most significant differences in formal aspects concerns the methodologies. The predominance of quantitative studies contrasts with the results of Moorhead et al. (2013), who found more qualitative analyses. However, bearing in mind that their study was based on social media networks in general and not exclusively on Twitter, our results suggest a preference for quantitative analyses when working with Twitter.

To conclude, through this systematic review we have found that conversation and engagement are the two most analyzed uses of Twitter. There is no consensus on the usefulness of Twitter as a tool for information or for generating debate, although its effectiveness in calculating the impact of health campaigns and identifying the most effective messages and actions was highlighted. On the other hand, most of the studies focused on the general public; and those addressing a specific audience mainly considered health professionals.

The present study has some limitations derived from the choice of texts as it only included papers published in peer-reviewed journals. Theses, conference proceedings, abstracts, editorials, and review papers were excluded. Had they been included, some of the results and conclusions might have been different.

Therefore, a potential future line of research would involve the analysis of doctoral theses on health communication and Twitter. Other trends suggested are the following.

1) More research into emotions and aspects such as users' perceptions, concerns, and behaviors.

2) Explore in greater depth Twitter user profiles (age, gender, etc.) in this area and the differences that can be derived from them.

3) Explore in greater depth the limitations of using Twitter in this area, as other studies have done for social media in general (Moorhead et al., 2013), and not just the more positive aspects.

4) Conduct further analysis using qualitative methodologies, with an international focus, or comparing at least more than one country.

5) Conduct further studies that present comparative analyses of two or more groups (patients, professionals, institutions, or organizations).

6) Apply the findings of the present analysis, e.g., on uses and valences, to other social networks.

Author Contributions

Jesús Díaz-Campo designed and conceptualized this review and the search strategy. Jesús Díaz-Campo and Belén Cambronero-Saiz conducted the systematic search, reviewed the papers for inclusion and exclusion and critically evaluated the findings. Belén Cambronero-Saiz extracted the data. All authors produced the draft of the manuscript, supported the interpretation of the data, critically reviewed and provided improvements to the draft manuscript and read and approved the final manuscript.

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Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest

The authors declare no conflict of interest.

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