

Exploring the Evolution of Social Media in Mental Health Interventions: A Mapping Review

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Summary

Background: With the rise of social media, social media use for delivering mental health interventions has become increasingly popular. However, there is no comprehensive overview available on how this field developed over time.

Objectives: The objective of this paper is to provide an overview over time of the use of social media for delivering mental health interventions. Specifically, we examine which mental health conditions and target groups have been targeted, and which social media channels or tools have been used since this topic first appeared in research.

Methods: To provide an overview of the use of social media for mental health interventions, we conducted a search for studies in four databases (PubMed; ACM Digital Library; PsycInfo; and CINAHL) and two trial registries (Clinicaltrials.gov; and Cochranelibrary.com). A sample of representative keywords related to mental health and social media was used for that search. Automatic text analysis methods (e.g., BERTopic analysis, word clouds) were applied to identify topics, and to extract target groups and types of social media.

Results: A total of 458 studies were included in this review (n=228 articles, and n=230 registries). Anxiety and depression were the most frequently mentioned conditions in titles of

both articles and registries. BERTopic analysis identified depression and anxiety as the main topics, as well as several addictions (including gambling, alcohol, and smoking). Mental health and women's research were highlighted as the main targeted topics of these studies. The most frequently targeted groups were "adults" (39.5%) and "parents" (33.4%). Facebook, WhatsApp, messenger platforms in general, Instagram, and forums were the most frequently mentioned tools in these interventions.

Conclusions: We learned that research interest in social media-based interventions in mental health is increasing, particularly in the last two years. A variety of tools have been studied, and trends towards forums and Facebook show that tools allowing for more content are preferred for mental health interventions. Future research should assess which social media tools are best suited in terms of clinical outcomes. Additionally, we conclude that natural language processing tools can help in studying trends in research on a particular topic.

Keywords

Social media, mental health, Internet-based intervention, research

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1 Introduction

It is believed that the precursor of what we now consider social media, called PLATO, was created in 1972 [1]. PLATO included online forums and message boards for the first time, making it the world's first online community [1]. Twenty-five years later, in 1997, a site called SixDegrees.com allowed users to create profiles, add friends, and interact with other users for

the first time [2, 3]. Since then, many social media platforms have been launched, and the number of social media users has grown exponentially every year. It is expected that by 2027, about 6 billion people will be social media users [4].

The popularity of social media and their great potential to engage with people suggest that these channels could be valuable for delivering and supporting many types of health interventions, including mental

health interventions. However, using social media in healthcare interventions is not exempt from challenges and ethical issues that need to be addressed, such as guaranteeing anonymity, privacy, confidentiality, and security, among others [5-9]. Despite these challenges, research on social media and health is growing increasingly. When searching PubMed for the term „social media“ in titles, the search engine returns over 8,000 references (Appendix 1, all the Appendices are available at the OSF platform doi: 10.17605/OSF.IO/8J6HV). The first three of these scientific articles indexed in PubMed date back to 2008 [10-12]. Shortly after these three first publications, a special interest working group at IMIA (International Medical Informatics Association), specifically focusing on social media, was founded in 2012 [13]. The IMIA Participatory Health and Social Media Working Group engages the international health informatics community and disseminates research on the use of social media for health [13]. Members of this working group have investigated a wide variety of topics around the use of social media for health [6-9, 14-17]. Beyond the research carried out by this working group, many teams have investigated how to best use social media for healthcare purposes. Guo *et al.* [18] conducted a review to identify and describe state-of-the-art health interventions using social media. They found that studies published until 2018 targeted modifiable health behaviors and that social media was mostly used to deliver education programs to raise awareness or knowledge of different conditions [18].

2 Objective

As mental disorders are currently recognized by the World Health Organization as the leading cause of years lived with disability [19], knowing the state-of-the-art social media interventions is of interest. When efficient, these interventions have the potential to address the shortage of skilled workers in the mental health domain. The objective of this paper is to provide an overview on the use of social media for mental health interventions over time. Specifically, we examine which mental health conditions and target groups have been targeted, and which social media channels or tools have been used since this topic first appeared in research. This serves as an example to outline research trends in social media-based health interventions.

3 Methods

We conducted a mapping review to provide an overview of social media use in interventions for mental health research. We have followed the PRISMA-S criteria to conduct and report the literature review [20].

3.1 Search Strategy, Eligibility, and Inclusion and Exclusion Criteria

The full search strategy was carried out on October 26, 2022, and covered four databases (PubMed, ACM Digital Library, PsycInfo, and CINAHL) and two registries (Clinicaltrials.gov, and Cochranelibrary.com) (see Appendix 2). A single reviewer searched for references in databases (EG), and in registries (KD). No additional online searches or information sources were used, nor citing references were screened, nor authors or experts were contacted to gather further information. We searched for a sample of representative keywords related to social media, and to mental health in the above-mentioned databases and registries (see Appendix 2).

We uploaded all search references to EndNote 20 and Rayyan and removed duplicates. All titles and abstracts were screened by one reviewer (EG) and a second reviewer (KD)

verified the adequacy of the classification by checking 10% of the classified studies. Conflicts were discussed.

References were included if: a) An intervention was described (i.e., randomized trials, non-randomized interventions, and study protocols); b) Social media was used for the intervention; c) The intervention targeted individuals with a mental health condition, formal or informal caregivers of individuals with mental health conditions; d) The intervention targeted wellbeing/mental health or symptoms; and e) were published in English. References that did not meet all the inclusion criteria were excluded.

3.2 Data Items and Data Extraction

We used text analysis tools to automatically collect information on topics. More specifically, we identified the main topics of the studies using word clouds, keyword searches and BERTopic analysis [21]. BERTopic is a transformer-based approach that embeds documents, reduces dimensionality, clusters documents, generates bag-of-words representations, and applies c-TF-IDF to generate topic representations. The source code used for topic modeling based on the BERTopic technique is available at the OSF platform (doi: 10.17605/OSF.IO/8J6HV). To improve the accuracy of our text analysis, we applied a standard stop-word list (https://scikit-learn.org/stable/modules/feature_extraction.html#using-stop-words) to remove terms that bear no specific meaning.

To provide an overview of the different publications over time, we classified the studies into three main periods: published up to 2009, published between 2010 and 2019, and published in 2020 onwards. For all included studies, we retrieved the full text or trial description from the registry webpage. The corresponding webpages of the registered trials were downloaded as PDF-Files and stored in Zotero. We applied natural language processing tools to automatically identify the number of documents that contained keywords related to social media and mental health that were used in the search engine. The following information included in the abstract and full text of

the included publications was analyzed: 1) Mental health topics, 2) Population, and 3) Social media use. The findings identified from the included references were reported in a narrative synthesis.

4 Results

A total of 6,905 references were identified in the database and registry searches. After removing duplicates, 5,861 references were screened, of which 458 met the inclusion criteria (see Figure 1). The list of selected references is provided in Appendix 3. The years of publication of the references ranged from 2007 to 2023. A total of 18 studies were published in the first period (up to 2009), 221 in the second decade (2010-2019); and 219 in the last one (2020 onwards). The number of published articles and registries by year are summarized in Appendix 4.

4.1 Main Topics Identified in Titles

The list of the top 20 most used terms in the titles of articles and records per period is presented in Table 1. In all three periods, the texts dealt with randomized controlled trials, anxiety, and depression. In the first period (up to 2009), phobia and panic seemed to be the additional conditions under consideration. By contrast, in the third period, COVID-19 was a new upcoming term. The word clouds of all topics included in the titles of the articles and records included in this review over the three periods are presented in Appendix 5.

4.2 Main Topics Identified in Full Texts (topics generated with BERTopic)

When identifying topics throughout the studies from all years, we can gain deeper insight into the groups of studies. We can distinguish studies on addiction, smoking interventions, pregnancy and depression, and anxiety and depression (see Table 2). A figure on the topics covered over time can be found in Appendix 6.

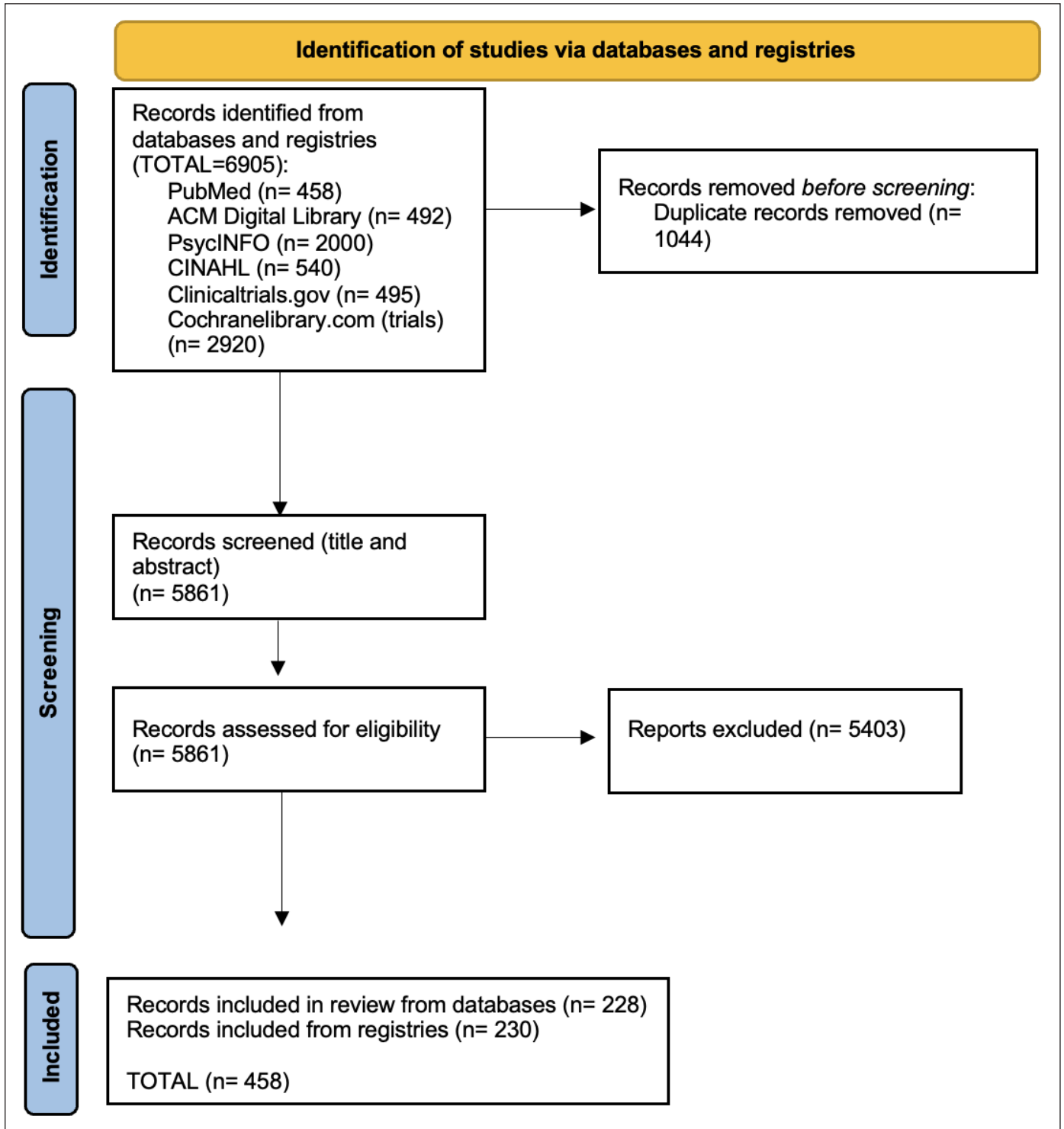


Fig. 1 PRISMA Flowchart of the literature and registry entries selection procedure

Table 1 Top 20 more commonly used terms in the titles of articles and records per period (presented in descending order according to their weight)

All periods (n=458)	Up to 2009 (n=18)	2010-2019 (n=221)	2020 onwards (n=219)
Randomized*	Internet	Intervention	Intervention
Trial	Randomized*	Trial	Randomized*
Intervention	Controlled	Randomized*	Trial
Controlled	Treatment	Controlled	Controlled
Social	Phobia	Social	Social
Depression	Social	Depression	Depression
Anxiety	Trial	Disorders	Media
Health	Disorder	Internet	Health
Study	Program	Online	Effect
Mental	Anxiety	Health	Anxiety
Online	Education	Study	Study
Media	Study	Support	Mental
Program	Clinician-assisted	Therapy	Patients
Disorder	Depression	Anxiety	Users
Therapy	Effectiveness	Mental	Covid-19
Effect	Panic	Media	Online
Pilot	Therapy	Pilot	Adolescents
Patients	Web-based	Treatment	Behaviour
Support	Behavior	Adults	Support
Effectiveness	Cessation	Effects	Adults

* Terms “randomized” and “randomised” were merged

Table 2 Results from the BERTopic modeling over all included references

Manual labeling of the topic	Topic-relevant terms as identified by BERTopic
Topic 0. General	patients, group, item, quotes, manuscript, study, subitem, intervention, information, cochrane
Topic 1. Methods and participants	study, treatment, goto, scale, youth, months, health, information, score, intervention
Topic 2. Methodology	cookies, central, cochrane, browse, language, intervention, added, issue, english, abstract
Topic 3. Pregnancy and depression	women, depression, pregnancy, mothers, health, perinatal, postpartum, maternal, study, mental
Topic 4. Smoking cessation	smoking, und, der, die, cessation, tobacco, quit, abstinence, participants, smokers
Topic 5. Anxiety disorder and depression	treatment, australia, psychiatry, health, mental, anxiety, disorder, participants, depression
Topic 6. Addictions	use, social, gambling, media, addiction, 2022, gaming, problematic, time, facebook
Topic 7. Mental health, eating	psychosis, Health, mental, intervention, group, participants, study, et, al, social
Topic 8. Body image	eating, intervention, media, body, social, study, health, scale, ybmen, 001
Topic 9. Interventions for youth and adolescents	health, mental, intervention, adolescents, youth, participants, study, helpseeking, trial, depression

4.3 Mental Health Topics, Target Population, and Social Media Use

The most frequently mentioned conditions were depression, anxiety, stress, and distress (see Appendix 7). Other mental health topics of interest include suicide, addiction, psychosis, and schizophrenia. Among the less covered mental health topics appear the neurodevelopmental disorders (such as attention-deficit hyperactivity disorder and autism spectrum disorder), or eating disorders (such as anorexia, or bulimia).

“Patients” was the most frequently used term to refer to the target population (n=278, 60.1%), followed by “Adults” (n=181, 39.5%); “Parents” (n=153, 33.4%); “Adolescents” (n=132, 28.8%); “Families” (n=131, 28.6%); “Children” (n=112, 24.5%); and “Youths” (n=86, 18.8%). An analysis of the terms used in titles reveals that „adults“ was one of the most used terms in the period 2010-2019. In the most recent period (2020 onwards), the term „adolescents“ has been added as an additional target group.

The proportion of studies that used different social media tools is presented in Appendix 8. In studies published until 2009, forums were the most frequently mentioned media. From 2010 to 2019, social media, WhatsApp, Facebook, and YouTube were slightly more often used. In the most recent period, the term social media is trending, jointly with Facebook and forums.

Furthermore, we identified common interventions delivered through social media platforms. “CBT” (Cognitive behavior therapy) was the most frequently mentioned one, cited in n=88, 19.2% of the studies; followed by “self-help” (n=74, 16.2%). Less frequently considered were peer support (n=34, 7.4%), and tele-health (n=48, 10.5%). The term “education” was found in 255 studies (55.7%).

5 Discussion

In our review, analysis of the most repeated topics in the titles indicated that the most frequently addressed conditions were anxiety disorders and depression, stress and distress. The analysis of the studies in full text with natural language processing has identified that

addictions (i.e., alcohol, gambling, smoking) and mental health in women are also leading research topics. Both adults and adolescents were the most frequently used terms for citing the targeted populations in titles, while the full-text analysis pointed to adults and parents as the most often mentioned groups. The terms “social media”, “online”, and “internet” were the most frequent modes of delivery of interventions reported in titles. The full-text analysis indicated that Facebook, WhatsApp, messenger in general, Instagram or forums were more common.

5.1 Reflections on the Trends and Recommendations for Future Research

The number of publications and registrations of studies using social media in interventions for mental health is increasing. The volume of publications in this field might respond to an attempt to address the current insufficient and inadequate responses to mental health needs [19] or can perhaps be seen as a call for action to consider mental health in lifestyle medicine [23]. It is important to note that evidence supporting the use of these channels in healthcare interventions is not yet clear. While some researchers refer to the potential of social media interventions for other health fields, for example for improving exercise behaviors [24, 25], for improving health literacy and promoting behavior change [26, 27], or delivering interventions to minority groups [28]; other researchers have highlighted the lack of a strong evidence supporting the use of these channels in healthcare interventions and therefore claiming more research on this field [29, 30]. Evidence on the effectiveness of social media interventions for mental health is similar. Systematic reviews specifically analyzing social media interventions for different mental health issues show that the current evidence is insufficient to support the clinical use of these tools for mental health interventions, and more research is needed [31, 32].

This review identified 114 studies on social media interventions for mental health that have been registered since 2020. This number represents almost half of all registered trials on social media for mental health over time. The increase in registrations after the

COVID-19 outbreak might be explained by the reinforced role of social media and digital technologies in general after the Covid-related restrictions. The findings from these registered studies are expected to be published soon. Therefore, evidence on the possible usefulness of social media interventions for mental health could soon increase. There is even more research in which social media have been investigated in relation to mental health. During the selection process, we rejected a large number of studies that used social media to recruit participants for their interventions, but did not use these tools as media for delivering their interventions. Ethical or privacy concerns [6-8] could be reasons why social media were not considered tools for delivering interventions in these studies.

Our finding that almost half of the studies report about education interventions allows us to conclude that many social media-based digital health studies address health education or health literacy in their intervention, in agreement with previous research [18]. Our overview also indicates that not much research has been conducted on social media interventions to benefit individuals with neurodevelopmental or eating disorders. The lack of social media interventions on eating disorders may be due to social media being considered as fueling the problem. Further studies are required to address this research gap.

A typical type of intervention is related to education. Future research should study, out of the diverse landscape of social media tools, which of them can be efficiently used for specific mental health interventions or in specific target groups; as well as the different types of interventions and which intervention can be delivered most successfully through which social media tools. More studies are needed to develop guidelines for developing social media-based interventions in mental health. A more structured assessment of this would be helpful in avoiding trial and error studies. Given the increasing number of studies and trial registrations on social media-based interventions for mental health, it may be concluded that research is already heading in this direction. Future research attempting to summarize the increasing number of publications and registries for mental health (or any other field) could benefit from using automated information extraction tools.

A similar trend analysis approach could be applied to other medical domains to identify trends and research gaps.

5.2 Study Strengths and Limitations

Attempting to perform a systematic review that includes many publications is challenging or perhaps impossible. The use of techniques that automatically help to identify topics seems to be a useful strategy to consider when dealing with large amounts of results and aiming to obtain an overview. As recommended in CONSORT-eHealth standards [22], essential items to be included in the titles of research on e-health interventions are the primary condition or the target group, and the mode of delivery of the intervention. Hence, analyzing titles seems to be a good strategy to obtain an overview of what has been published, especially when published research has followed the recommended reporting standards [22].

However, our study has several limitations. We used only a sample of representative keywords in our search. Because we aimed to use an automatic topic classification tool, we were only able to focus on references published in English. Hence, we might have missed studies and registrations including different terms, or those published in other languages. We had difficulties in matching publications with registries when registry identification was not provided in the abstracts. Therefore, repeated records of registries and their publications may have been analyzed. The entire content was analyzed. Hence, the text under consideration includes references and citations. This may have resulted in a slight overestimation of the actual number of counted occurrences of social media types. When analyzing records from trial registries, their forms and tables were considered as texts. This could have led to an overestimation of some terms, such as table headings in the trial registry form. The stop-words list we used did not include common terms like „et al.“, which led to their inclusion into the analysis. The population data were extracted using a simple string match. Therefore, we cannot determine whether it is the target group of the reported study. We have considered three periods in time of different length which might lead to misunderstandings. However, we considered

percentages instead of absolute numbers which might balance the different amounts of text considered within a period. Despite these limitations, we believe our approach is useful for obtaining an overview of the progress and most topics covered by research on social media interventions for mental health.

6 Conclusions

The use of social media for delivering mental health interventions is increasing, as evidenced by the growing number of publications and registered trials. Multiple mental health conditions are considered targets for such interventions, although there is a recognized focus on anxiety and depression. A variety of tools have been studied, and trends towards forums and Facebook show that tools allowing for more content are preferred for mental health interventions. Future research should assess which social media tools are best suited in terms of clinical outcomes. Additionally, we conclude that natural language processing tools can help to study trends in research on a particular topic.

Supplementary material and Appendices are available at the OSF platform (doi: 10.17605/OSF.IO/8J6HV).

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