Review

Social Media–Based Interventions for Health Behavior Change in Low- and Middle-Income Countries: Systematic Review

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Abstract

Background: Despite the wealth of evidence regarding effective health behavior change techniques using digital interventions to focus on residents of high-income countries, there is limited information of a similar nature for low- and middle-income countries.

Objective: The aim of this review is to identify and describe the available literature on effective social media–based behavior change interventions within low- and middle-income countries.

Methods: This systematic review was conducted in accordance with the 2009 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. We searched PubMed, Embase, Elsevier, CINAHL, PsycInfo, and Global Index Medicus, and the final search was conducted on April 6, 2021. We excluded studies published before 2000 because of the subject matter. We included studies that evaluated interventions conducted at least partly on a social media platform.

Results: We identified 1832 studies, of which 108 (5.89%) passed title-abstract review and were evaluated by full-text review. In all, 30.6% (33/108) were included in the final analysis. Although 22 studies concluded that the social media intervention was effective, only 13 quantified the level of social media engagement, of which, few used theory (n=8) or a conceptual model (n=5) of behavior change.

Conclusions: We identified gaps in the settings of interventions, types and sectors of interventions, length of follow-up, evaluation techniques, use of theoretical and conceptual models, and discussions of the privacy implications of social media use.

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KEYWORDS

social media; behavior change; low- and middle-income countries; mobile phone

Introduction

Background

Social media platforms are ubiquitous in modern world. Social media has become a widely used platform for advertisers, news media, and government agencies to reach billions of users as a form of connection and a means of communication with relatives, friends, businesses, colleagues, media figures, and acquaintances. For example, Meta (formerly known as Facebook) is a major conglomerate of social media networks, and it is estimated that 2.7 billion active users engaged with their flagship Facebook social media service in mid-2020 [1]. With such a wide reach and worldwide omnipresence, social media platforms—including Instagram, Twitter, Reddit, WeChat, and others—have been of increasing interest in the
implementation of behavior change interventions and public health campaigns.

In a 2018 systematic review, Elahee et al [2] determined that among peer-based social media interventions focused on tobacco smoking, nutrition, physical activity, or alcohol consumption, those with a sharing-enabled feature were most likely to elicit positive intervention outcomes. Results from multiple systematic reviews suggest that among adolescents and children, social media interventions—in comparison with in-person interventions—are underused; however, they may be effective tools for health promotion and behavior change [3-6].

Despite their potential utility, social media platforms have a checkered history of privacy and data theft. Of note is the mismatch in the intention versus actualization of privacy behavior and data sharing on social media platforms [7,8]. Although many people cite the desire to protect their privacy and limit the amount of information gathered by said platforms, average social media users do not exercise caution when granting access to third-party software or websites to use their data [7]. Given the diminished barrier to data collection as well as the high financial value and ease of access of said data, researchers have called for increased protection against malicious data exploits (eg, theft) and the development of ethical frameworks that encourage cautious behavior in both data collection and social media use [9-11].

Behavior change strategies implemented using digital technology include training, coaching, and text messages, all of which are potentially more effective with increased frequency, intensity, and follow-up [12]. Overall, the most effective health behavior change interventions use a combination of both digital and face-to-face components, lending credence to the importance of classical social behavior change modalities, including human interaction and in-person accountability [5,13-15]. The most commonly cited research gaps include multiple, noncomparable measures (eg, engagement and reach) to evaluate digital media–related behavior change campaigns [3,16,17]. Other areas highlighted for improvement include clarification of dose, intensity of intervention delivery, and measurement of long-term outcomes [17,18].

The preponderance of evidence characterizing effective behavior change techniques using digital interventions has been collected by focusing on residents of high-income countries. There are limited data of a similar nature for low- and middle-income countries (LMICs). A recent Pew Research study explored internet and smartphone use in LMICs and found a median of 67% of respondents reported having access to and using the internet, with 42% reporting access to smartphones in 2017 [19]. In the context of technology-based interventions for HIV prevention and care delivery, Maloney et al [20] found that, compared with high-income countries, the distinguishing characteristic of a successful intervention in LMICs appeared to be related to how well the intervention was tailored to serve the unique needs of a given community, village, or region, which was highly dependent on the culture within that group. Given the demonstrated need for these interventions to be crafted specifically for the setting of interest and the growing availability of technology in LMICs, a focus on behavior change interventions delivered over social media in LMICs is justified.

Objectives

The goal of this review is to identify and describe the available literature regarding effective social media–based health behavior change interventions within LMICs.

Methods

Overview

We conducted a systematic review in concordance with the 2009 PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to understand what behavioral interventions have been implemented using social media in LMICs and to characterize the evidence of their effectiveness [21]. One of our goals was to gather data on where and how these interventions are being implemented, including what subject areas have used social media interventions and for which outcomes. We also aimed to assess evaluation patterns, both in terms of the type of evaluations being carried out and whether social media interventions were deemed effective. Finally, we intended to collect information on funding sources, cost-effectiveness, and the use of theoretical and conceptual models. The review was registered with PROSPERO, where the review protocol can be viewed (registration number CRD42020223572).

Search Strategy and Selection Criteria

We searched PubMed, Embase, Elsevier, CINAHL, PsycInfo, and Global Index Medicus for studies that detailed behavior change interventions with some component conducted on a social media platform. Our search terms, which were developed with the help of both subject matter experts and a librarian with expertise in conducting systematic reviews, encompassed both social media and health behavior change concepts and included terms to describe LMICs, as well as the names of all countries categorized as LMICs by the World Bank (Multimedia Appendix 1 provides full search threads). The final search for publications included in this review was conducted on April 6, 2021.

In recognition of the fact that social media is a relatively new format, we used search string limitations to exclude studies published before the year 2000. We also excluded studies for which we could not find a full-text version in English, including conference abstracts.

Studies were selected for review if they presented original evaluation data (formative, process or implementation, outcome or effectiveness, or impact related) for a behavior change intervention that was at least partly conducted over a social media platform and used the social components of the medium [22]. We included studies that examined changes in both behavior and health knowledge.

We excluded studies that did not describe a purposeful, planned intervention; accidental changes in service delivery that resulted in natural experiments were not of interest. We also excluded studies that included only 1-way communication, such as reminder text messages, as opposed to a multidirectional...
exchange of information, ideas, or opinions. For example, studies that described interventions that involved automated daily reminders for a certain behavior were excluded, as were studies that involved promulgating advertisements on a social media platform without evaluating engagement.

For our purposes, we defined social media relatively broadly and included search terms that would identify studies that used specific platforms that connect a network of individuals together for behavior change purposes, including both those tailor-made for the purposes of the intervention as well as the more established social networks that exist for commercial purposes (ie, Twitter, Facebook, and WhatsApp). However, we excluded studies that used social media to implement one-to-one conversations, such as conversations between health care providers and patients, as these conversations did not use the networking component of the apps.

In all, 2 independent reviewers used Covidence (Covidence systematic review software, Veritas Health Innovation) to screen each title and abstract to identify potentially eligible records (JS, TEL, or EJ). During screening, disagreements among the reviewers were settled through team consensus. If the disagreement could not be settled with information available in the title and abstract, the study was passed on to a full-text review. Full-text versions of potentially eligible records were reviewed and data were independently extracted by 2 reviewers, with discrepancies resolved through discussion and consensus (JS, TEL, or EJ).

**Data Extraction**

We extracted information on each identified program, including its setting, intended audience, and intended behavior change; the method of measuring both exposure and outcome; the strength of the descriptions of the intervention and its social media components; the social media platform used and its role; observed outcomes; how they were evaluated; cost information; and whether their design and implementation were guided by the use of a theoretical framework or conceptual model. We also looked for information on how social media’s role in each intervention was described and evaluated. Data extraction was conducted by a single reviewer for each study, with 10% of the manuscripts and extracted data selected randomly for quality control checking by a second reviewer (JS, TEL, or EJ).

The evaluation-specific information extracted for each study varied depending on the stage of evaluation assessed in the publication. For the process or implementation evaluations, we looked for information on the focus of the interventions and barriers to and facilitators of implementation. For outcome evaluations, we looked for the same indicators as we did for process or implementation evaluations along with data on changed behaviors. For impact evaluations, we collected all the indicators already mentioned as well as data on changes in health outcomes among participants.

For all studies, we searched for information on funding and cost-effectiveness associated with the program. We also extracted information on whether and how each intervention used a theoretical framework in its design and implementation.

**Risk of Bias Assessment**

For each study, we conducted a qualitative assessment of the potential for bias based on the available descriptions of methods for inclusion in the intervention and analysis of the results, when available. We also noted the potential for bias, as recorded in the *Limitations* section.

**Results**

**General Characteristics of Included Studies**

A total of 1832 studies were identified based on the search strategy, of which 108 (5.89%) passed title-abstract review and were evaluated by full-text review (Figure 1). At full-text review, 75 studies were excluded: 22 (29%) for using a social media platform without using the networking capabilities of these platforms (ie, for using only one-to-one communications), 19 (25%) because no version of the full text of the study could be found in English, 16 (21%) because no intervention was described, 12 (16%) because the intervention did not take place in an LMIC, and 6 (8%) because the intervention did not use a social media platform at all. Finally, 33 studies were included in this review [23-55]. The key study characteristics are summarized in Tables 1 and 2.
Figure 1. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram. LMIC: low- and middle-income country.
Table 1. Characteristics of the included studies.

| Study                     | Setting                              | Target audience of behavior                                      | Desired behavior change                                           | Social media platform used                | Length of follow-up |
|---------------------------|--------------------------------------|-------------------------------------------------------------------|------------------------------------------------------------------|------------------------------------------|---------------------|
| Garrett et al [23]        | Lima metro area, Peru                | MSM² adults at high risk of HIV                                   | HIV testing                                                      | Facebook                                 | 1 year              |
| Young et al [24]          | Lima metro area, Peru                | MSM adults at high risk of HIV                                     | HIV testing                                                      | Facebook                                 | 1 year              |
| Harding et al [25]        | Ghana                                | People who breastfeed or might be in a position to support or promote breastfeeding | Breastfeeding and supporting breastfeeding                       | Facebook and Twitter                    | No information available |
| Cao et al [26]            | Guangdong and Shan-dong provinces, China | MSM aged >16 years                                               | HIV testing                                                      | WhatsApp                                 | 3 months            |
| Sap et al [27]            | Cameroon                              | Adolescents and young adults living with diabetes                | Diabetes knowledge and glycemic control                          | Not specified                            | 2 months            |
| Cole et al [28]           | Kerala, India                         | People living in the area of a Nipah virus outbreak               | Nipah virus knowledge                                            | Reddit                                   | No information available |
| Hutchinson et al [29]     | Kenya                                 | Adolescents and young adults                                      | Increased knowledge and changed behaviors around family planning and income generation | Facebook, Twitter, Instagram, YouTube, and WhatsApp | 1 year              |
| Goldenhersch et al [30]   | Buenos Aires, Argentina               | Smokers aged between 26 and 65 years                             | Tobacco cessation                                                | Created for the intervention            | 90 days             |
| Cool et al [31]           | The Philippines                       | General population                                                | Emergency response to typhoon                                    | Facebook, Twitter and Instagram         | No information available |
| Hamill et al [32]         | Alexandria, Egypt                     | General population                                                | Build awareness and support for an upcoming smoking ban          | Facebook                                 | 1 month             |
| Jiebing et al [33]        | Tibet                                 | Pregnant women                                                    | Increase number of prenatal care visits                          | WeChat                                  | Length of pregnancy |
| Mo et al [34]             | Shanghai, China                       | Undergraduate students                                            | Increased physical activity                                      | WeChat                                  | 7 weeks             |
| Wu et al [35]             | Guangzhou and Shenzhen, China         | MSM                                                                | Increase STI² testing and other health-seeking activities         | Created for the intervention            | No information available |
| Ahmad et al [36]          | Selangor, Malaysia                    | Parents and their primary school-going children (aged 8-11 years who were overweight or obese) | Physical activity, healthy diet, and reduced screen time         | WhatsApp and Facebook                   | 6 months            |
| Cavalcanti et al [37]     | João Pessoa city, Brazil              | Mothers who recently gave birth                                   | Breastfeeding                                                    | Facebook                                 | 6 months            |
| Chen et al [38]           | China                                 | Chinese men aged 25-44 years who smoke tobacco                    | Smoking cessation                                                | WeChat                                  | 6 weeks             |
| Todorovic et al [39]      | Belgrade, Serbia                      | First and fifth-year medical students                            | Physical activity                                                | Facebook                                 | 1 month             |
| Chai et al [40]           | Zhongshan City, Guangdong Province, China | Employees of labor-intensive manufacturing factories aged >16 years | Smoking cessation                                                | WeChat                                  | 1 month             |
| Lwin et al [41]           | Sri Lanka                             | General population                                                | Dengue knowledge and prevention strategies                      | Created for the intervention            | No information available |
| Pereira et al [42]        | Brazil                                | General population                                                | Uptake of HPV⁶ vaccine                                            | Facebook                                 | No information available |
| Gamboa et al [43]         | La Vega, San Francisco, and Puerto Plata; Dominican Republic | Youth aged 14-18 years in communities at high risk for arboviruses | Zika prevention behaviors                                       | Facebook                                 | No information available |
| Study | Setting | Target audience of behavior | Desired behavior change | Social media platform used | Length of follow-up |
|-------|---------|-----------------------------|-------------------------|---------------------------|--------------------|
| Januraga et al [44] | Indonesia | Urban, unmarried adolescent girls aged 16-19 years | Healthy diet | Facebook, Instagram, YouTube, and another app created for the intervention | No information available |
| Thammasarn and Banchonhattachit [45] | Nakhon Ratchasima Province, Thailand | Senior-primary school students | Physical activity and healthy diet | Not specified | No information available |
| He et al [46] | China | General population | Weight loss | WeChat | No information available |
| Souza et al [47] | Brazil | Community leaders | Civic engagement in general public health work | WhatsApp | No information available |
| Chiu et al [48] | Peru | MSM | HIV prevention and testing | Facebook | No information available |
| Chiu et al [49] | Peru | MSM | HIV prevention and testing | Facebook | No information available |
| Purdy [50] | Turkey | General population | Condom use | Facebook | No information available |
| Parsapure et al [51] | Kermanshah, Iran | General population | Vaginal health | Not specified | 6 months |
| Wu et al [52] | Huzhu County, Qinghai Province, China | Breastfeeding mothers aged >17 years | Breastfeeding | WeChat | 5 months |
| Hutchinson et al [53] | Ghana | Adolescent girls | Refusal to smoke tobacco | Facebook, Instagram, and YouTube | No information available |
| Diamond-Smith [54] | India | Women aged between 18 and 49 years | Anemia-related knowledge | Facebook | 5 months |
| Chang et al [55] | Zhejiang Province, China | General population | Physical activity and healthy diet | WeChat | No information available |

aMSM: men who have sex with men.
bSTI: sexually transmitted infection.
cHPV: human papillomavirus.
Table 2. Methodologic quality, cost, and funding of included studies.

| Study                  | Social media’s role in this intervention or outcome clearly reported | This role quantified<sup>a</sup> | Social media described as effective | Theoretical model application | Conceptual model application | Cost of intervention reported | Funding source reported | Sources of bias reported                                                                 |
|------------------------|---------------------------------------------------------------------|---------------------------------|-----------------------------------|------------------------------|-----------------------------|-------------------------------|------------------------|------------------------------------------------------------------------------------------|
| Garett et al [23]      | Yes                                                                 | No                              | Yes                               | No                           | No                          | No                            | Yes                    | Recall                                                                                   |
| Young et al [24]       | Yes                                                                 | Yes                             | Yes                               | No                           | No                          | No                            | Yes                    | Self-reported                                                                            |
| Harding et al [25]     | Yes                                                                 | Yes                             | Yes                               | No                           | No                          | No                            | Yes                    | Nonrepresentative of general population owing to internet or social media access          |
| Cao et al [26]         | Yes                                                                 | No                              | Yes                               | No                           | No                          | No                            | No                     | Nonrepresentative of general population owing to internet or social media access; self-reported |
| Sap et al [27]         | Yes                                                                 | No                              | Yes                               | No                           | No                          | No                            | No                     | None                                                                                     |
| Cole et al [28]        | Yes                                                                 | Yes                             | Yes                               | No                           | No                          | No                            | Yes                    | None                                                                                     |
| Hutchinson et al [29]  | No                                                                  | No                              | Yes                               | Trantheoretical model        | No                          | No                            | Yes                    | Nonrepresentative of general population owing to internet or social media access          |
| Goldenhersch et al [30]| Yes                                                                | Yes                             | Yes                               | Contemplation ladder         | No                          | No                            | Yes                    | Short follow-up; self-reported                                                             |
| Cool et al, 2015 [31]  | Yes                                                                | Yes                             | Yes                               | No                           | No                          | No                            | Yes                    | None                                                                                     |
| Hamill et al, 2015 [32]| Yes                                                                | Yes                             | Yes                               | No                           | No                          | Yes                            | Yes                    | None                                                                                     |
| Jiebing et al [33]     | Yes                                                                | No                              | Yes                               | No                           | No                          | No                            | Yes                    | None                                                                                     |
| Mo et al [34]          | Yes                                                                | No                              | Yes                               | Theory of planned behavior   | No                          | No                            | Yes                    | Self-reported                                                                            |
| Wu et al [35]          | No                                                                  | No                              | No                                | No                           | No                          | No                            | Yes                    | Nonrepresentative of general population owing to internet or social media access          |
| Ahmad et al [36]       | Yes                                                                | Yes                             | Yes                               | Social cognitive theory      | Yes                         | No                            | Yes                    | Nonrepresentative of general population owing to internet or social media access; other selection bias |
| Cavalcanti et al [37]  | Yes                                                                | Yes                             | Yes                               | No                           | No                          | No                            | No                     | Research team was not blinded to randomization                                           |
| Chen et al [38]        | No                                                                  | No                              | No                                | COM-B<sup>b</sup> and Behavior Change Wheel framework | Yes                         | No                            | Yes                    | Participants and researchers were not blinded                                            |
| Todorovic et al [39]   | Yes                                                                | No                              | Yes                               | No                           | No                          | No                            | Yes                    | No randomization                                                                         |
| Chai et al [40]        | No                                                                  | No                              | No                                | Yes                           | No                          | No                            | Yes                    | Lost to follow-up                                                                         |
| Lwin et al [41]        | No                                                                  | No                              | No                                | Protection motivation theory  | Yes                         | No                            | Yes                    | Nonrepresentative of general population owing to internet or social media access          |
Geographic and Methodological Characteristics of Included Studies

The studies included for review were conducted in geographically diverse LMICs, with China (8/33, 24%), Peru (4/33, 12%, all from the same program), and Brazil (3/33, 9%) being the sites with the most social media–based interventions (Table 3). Other countries included Argentina, Cameroon, the Dominican Republic, Egypt, Ghana, India, Indonesia, Iran, Kenya, Malaysia, Serbia, Sri Lanka, Thailand, the Philippines, and Turkey (Table 1). Of these, 33% (11/33) are upper-middle–income countries and 21% (7/33) are lower-middle–income countries.

Of the 33 studies included in the review, 23 (70%) were limited to a particular subnational locality, typically either a large city or a particular region, and 10 (30%) were designed to be national in scope.

Common study designs included randomized trials (12/23, 52%) and observational studies (11/23, 48%). Only 13% (3/23) of studies were qualitative, and none used mixed methods.

Common focus populations included a particular age group of interest (11/23, 49%), the general population (8/23, 35%), and men who have sex with men (6/23, 26%). The desired behavior change component varied widely, but studies most frequently aimed to change HIV testing and knowledge (5/23, 22%), increase physical activity and weight loss (5/23, 22%), and smoking cessation (5/23, 22%).

Studies have frequently combined types of evaluations, with 6% (2/33) of studies including components related to formative...
evaluations, 52% (17/33) with process evaluation components, 76% (25/33) with outcome indicators, and 18% (6/33) with impact measurements. In all, 9% (3/33) of studies were described with insufficient detail to clarify the specific type of evaluation conducted.

Although most studies described the overall interventions thoroughly enough that they could be understood (24/33, 73%), few reported social media use with sufficient clarity (19/33, 58%). In 42% (14/33) of studies, the role of social media in greater intervention was quantified using some measure of engagement, including clicks, likes, comments, shares, and retweets. However, the authors concluded that the use of social media was effective (22/33, 67%). Studies, especially those with data on outcomes or impacts, frequently paired data on social media use with a measurement of effectiveness captured outside of social media use, such as changes in anthropometric measurements, knowledge of a specific health topic, or smoking status (22/33, 67%).

### Table 3. Characteristics of included studies (N=33).

| Study characteristics                      | Studies, n (%) |
|-------------------------------------------|----------------|
| **Country**                               |                |
| China                                     | 8 (24)         |
| Peru                                      | 4 (12)         |
| Brazil                                    | 3 (9)          |
| Othera                                    | 19 (58)        |
| **Social media platform**                 |                |
| Facebook                                  | 17 (52)        |
| WeChat                                    | 8 (24)         |
| Instagram                                 | 4 (12)         |
| Platform created for intervention         | 4 (12)         |
| YouTube                                   | 3 (9)          |
| WhatsApp                                  | 3 (9)          |
| Twitter                                   | 3 (9)          |
| Reddit                                    | 1 (3)          |
| Multiple platforms                        | 6 (18)         |
| **Methodologic quality**                  |                |
| The role of social media in this intervention or outcome was clearly reported | 24 (73) |
| This role was quantified through clicks, shares, comments, or other method of engagement | 14 (42) |
| Social media was described as effective   | 22 (67)        |
| A theoretical or conceptual model was used | 10 (30)        |

aArgentina, Cameroon, the Dominican Republic, Egypt, Ghana, India, Indonesia, Iran, Kenya, Malaysia, Serbia, Sri Lanka, Thailand, the Philippines, and Turkey.
bCategories are not mutually exclusive.

Facebook was the most common social media platform used in the studies (17/33, 52%), followed by WeChat (8/33, 24%), Instagram (4/33, 12%), and WhatsApp (3/33, 9%; Table 3). A few studies (4/33, 12%) designed their own apps for use on mobile phones with built-in social media components and 18% (6/33) of studies spread their efforts across several platforms (eg, Facebook, Twitter, and Instagram).

Few studies included a description of either a theoretical model (8/33, 24%) or developed a conceptual model (5/33, 15%) that guided researchers’ efforts in the design or evaluation stages. Although clear information on the cost of the interventions was rare (1/33, 3%), most (24/33, 73%) studies included information on sources of funding.

Although every study focused on an intervention that, by its nature, required access to technology and the internet, relatively few highlighted this as a potential source of selection bias that might lessen an intervention’s external validity (11/33, 33%). This suggests that researchers do not perceive technology access as an obstacle to the effective implementation of such interventions in LMICs.

The length of observation after the intervention ended for most of the studies was relatively short, with no studies following up with their participants for more than a year, and half of the studies (17/33, 52%) did not report any follow-up data.

Finally, none of the studies included in this systematic review reported on the methods used to diminish the possibility of interference or data theft on behalf of the participants from
internet service providers, software developers, social media services (where applicable), or other interactive users, despite the sharing of data with a third-party service being a requisite of participation eligibility.

Discussion

Principal Findings

In this systematic review of studies on interventions that use social media to encourage health behavior change in LMICs, we evaluated 33 studies across a range of interventions, settings, and techniques. We identified important gaps in the types and sectors of interventions, length of follow-up, evaluation techniques, use of theoretical and conceptual models, and discussions of the privacy implications of social media use. In addition, we found that although social media interventions have been conducted in a number of LMICs worldwide, few have been conducted in the poorest countries and few have been done in sub-Saharan Africa.

The range of interventions described in the studies included in this review was limited. We found that the body of literature on behavior change in LMICs is not able to address the question of whether social media is generally useful in these settings or even appropriate for certain types of behavior change work specifically. These determinations will likely need to be extremely context-specific, given the variation in social media access and willingness to use it for this type of work.

A conspicuous limitation of most of the studies included in this review was the lack of data on long-term outcomes and impact. Behavior change can take time, and the potential for regression to earlier states is well known. Future research should include a longitudinal follow-up to assess the long-term effects of social media behavioral interventions. In addition, there was a lack of evidence on the effectiveness of theories of change in social media interventions, and future research should focus on testing processes of change.

Given the relative novelty of behavior change interventions conducted via social media, the lack of formative research evaluating the feasibility, appropriateness, and acceptability of specific types of projects is troubling. The earliest study to use formative research was published in 2015, many years after social media became widespread. Formative research helps ensure that a specific intervention is likely to be needed, understood, and accepted by the population of interest. Without this critical step, it is possible to miss important modifications that would have helped shape extant interventions into successful social media–based projects [56]. There are examples of such formative studies in high-income countries, but we found no such formative research in this review. A more rigorous application of the principles of program evaluation will help develop targeted, effective social media–based interventions.

One of the strengths of social media interventions is the availability of objective dosage and exposure data from analytics. However, our review found that some studies reported that their social media efforts were effective without clearly reporting quantitative data (eg, clicks, shares, and views) on social media use. Future research should examine the characteristics of engagement exposure to evaluate dose–response effects, that is, to determine whether more exposure or exposure of a specific type is associated with successful behavior change. It is important to objectively attribute intervention effects to observed behavior changes and build an evidence base in the field.

Our review identified important gaps in the application of theoretical and conceptual models to explain why a particular intervention was needed, how it might have been expected to work, and how it could have been evaluated. The relatively low number of studies embracing this method is concerning, especially given the novelty of social media–based interventions. The use of evidence-based behavioral theory and a program-specific model are hallmarks of well-designed interventions, and these methods need to be explicitly included to support evaluations of future social media interventions in LMICs [57].

Finally, this review raises the question of the ethical implications of using a third-party social media service as a medium for conducting public health experiments. Of notable concern are the various ways in which a study participant’s privacy could be violated. When a user interacts with a wide-reaching social media platform (eg, Facebook or Twitter), there are multiple stakeholders who may have a vested interest in harvesting any data or communication provided by the participant: internet service providers, social media platforms, other interactive users, or even a governmental entity with a backdoor encryption policy. Ensuring participant security and protection of privacy are among the most critical components of ethical research; explicit explanation of these risks to personal data loss is necessary to incorporate in every public health social media study.

Limitations

Although this study was conducted following the PRISMA guidelines, there are some important limitations to this systematic review. We did not conduct any quantitative review of the studies or meta-analysis; therefore, we were unable to provide a quantitative assessment of the effectiveness of the interventions of interest. We also limited our search by not availing ourselves of unpublished literature or literature published in a language other than English, where it is possible that we would have found additional intervention descriptions.

Conclusions

In conclusion, as social media becomes a more powerful and omnipresent factor in people’s lives, its potential as a platform for public health work has grown rapidly. This systematic review of social media–based behavior change interventions conducted in LMICs highlights the need for diversity and methodological rigor at every step in the planning, implementation, and evaluation stages of programming.
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Authors' Contributions
JS reviewed titles and abstracts, reviewed full-text manuscripts, verified the data, conducted the data analysis and interpretation, drafted and edited the manuscript, and managed the review process. TEL coordinated search string development, reviewed titles and abstracts, reviewed full-text manuscripts, verified the data, assisted with data analysis and interpretation, and drafted the manuscript. EJ coordinated the initial literature review, reviewed titles and abstracts, reviewed full-text manuscripts, verified the data, assisted with the data analysis and interpretation, and drafted the manuscript. JRL provided project supervision and edited the manuscript. WDE conceived the idea for this work, edited the manuscript, and approved the final work. All authors have full access to all data in the study and accept responsibility for the decision to submit for publication.

Conflicts of Interest
None declared.

Multimedia Appendix 1
Search string for Embase.
[DOCX File , 15 KB-Multimedia Appendix 1]

References
1. Number of monthly active Facebook users worldwide as of 4th quarter 2021 (in millions). Statista. 2020. URL: https://www.statista.com/statistics/264810/number-of-monthly-active-facebook-users-worldwide/ [accessed 2020-11-19]
2. Elaheebocus SM, Weal M, Morrison L, Yardley L. Peer-based social media features in behavior change interventions: systematic review. J Med Internet Res 2018;20(2):e20 [FREE Full text] [doi: 10.2196/jmir.8342] [Medline: 29472174]
3. Hsu MS, Rouf A, Allman-Farinelli M. Effectiveness and behavioral mechanisms of social media interventions for positive nutrition behaviors in adolescents: a systematic review. J Adolesc Health 2018;63(5):531-545. [doi: 10.1016/j.jadohealth.2018.06.009] [Medline: 30197198]
4. Chau MM, Burgermaster M, Mamykina L. The use of social media in nutrition interventions for adolescents and young adults-a systematic review. Int J Med Inform 2018;120:77-91 [FREE Full text] [doi: 10.1016/j.ijmedinf.2018.10.001] [Medline: 30493048]
5. Brigden A, Anderson E, Linney C, Morris R, Parslow R, Serafimova T, et al. Digital behavior change interventions for younger children with chronic health conditions: systematic review. J Med Internet Res 2020;22(7):e16924 [FREE Full text] [doi: 10.2196/16924] [Medline: 32735227]
6. Chan L, O'Hara B, Phongsavan P, Bauman A, Freeman B. Review of evaluation metrics used in digital and traditional tobacco control campaigns. J Med Internet Res 2020;22(8):e17432 [FREE Full text] [doi: 10.2196/17432] [Medline: 32348272]
7. Acquisti A, Brandimarte L, Loewenstein G. Privacy and human behavior in the age of information. Science 2015;347(6221):509-514. [doi: 10.1126/science.aaa1465] [Medline: 25635091]
8. Fleming P, Bayliss AP, Edwards SG, Seger CR. The role of personal data value, culture and self-construal in online privacy behaviour. PLoS One 2021;16(7):e0253568 [FREE Full text] [doi: 10.1371/journal.pone.0253568] [Medline: 34270577]
9. Aimeur E, Díaz Ferreyra N, Hage H. Manipulation and malicious personalization: exploring the self-disclosure biases exploited by deceptive attackers on social media. Front Artif Intell 2019;2:26 [FREE Full text] [doi: 10.3389/frai.2019.00026] [Medline: 33733115]
10. Phillips AM. Genomic privacy and direct-to-consumer genetics: big consumer genetic data — what’s in that contract? In: IEEE Symposium on Security and Privacy Workshops. 2015 Presented at: SPW ’15; May 21-22, 2015; San Jose, CA p. 60-64. [doi: 10.1109/spw.2015.19]
11. Adams SA, Van Veghel D, Dekker L. Developing a research agenda on ethical issues related to using social media in healthcare. Camb Q Healthc Ethics 2015;24(3):293-302. [doi: 10.1016/S0963180114000619] [Medline: 26059955]
12. Chapman E, Haby MM, Toma TS, de Bortoli MC, Illanes E, Oliveros MJ, et al. Knowledge translation strategies for dissemination with a focus on healthcare recipients: an overview of systematic reviews. Implement Sci 2020;15(1):14 [FREE Full text] [doi: 10.1186/s13012-020-0974-3] [Medline: 3213861]
13. Mansour D, Nashwan A, Abu Rasheed H, Hararah M, Nassar H, Abu Abbas R, et al. Use of social media in breast cancer awareness: GCC countries’ experience. J Glob Oncol 2018;4(Supplement 2):30S. [doi: 10.1200/jgo.18.66200]
14. Swanton R, Allom V, Mullan B. A meta-analysis of the effect of new-media interventions on sexual-health behaviours. Sex Transm Infect 2015;91(1):14-20. [doi: 10.1136/sextrans-2014-051743] [Medline: 25433051]

15. Ziegeldorf A, Wagner P, Wulf H. Effects of media-assisted therapeutic approaches on physical activity of obese adults: a systematic review. BMC Endocr Disord 2020;20(1):28 [Full text] [doi: 10.1186/s12902-020-00505-x] [Medline: 32085762]

16. Johns DJ, Langley TE, Lewis S. Use of social media for the delivery of health promotion on smoking, nutrition, and physical activity: a systematic review. Lancet 2017;390:S49. [doi: 10.1016/s0140-6736(17)32984-7]

17. Naslund JA, Kim SJ, Aschbrenner KA, McCulloch LJ, Brunette MF, Dallery J, et al. Systematic review of social media interventions for smoking cessation. Addict Behav 2017;73:81-93 [Full text] [doi: 10.1016/j.addbeh.2017.05.002] [Medline: 28499259]

18. Simeon R, Dewidar O, Trajin J, Duench S, Manson H, Pardo Pardo J, et al. Behavior change techniques included in reports of social media interventions for promoting health behaviors in adults: content analysis within a systematic review. J Med Internet Res 2020;22(6):e16002 [Full text] [doi: 10.2196/16002] [Medline: 32525482]

19. Poushter J, Bishop C, Chwe H. Social media use continues to rise in developing countries but plateaus across developed ones: digital divides remain, both within and across countries. Pew Research Center. 2018. URL: https://tinyurl.com/2p8dpbh22 [accessed 2020-11-19]

20. Maloney KM, Bratcher A, Wilkerson R, Sullivan PS. Electronic and other new media technology interventions for HIV care and prevention: a systematic review. J Int AIDS Soc 2020;23(1):e25439 [Full text] [doi: 10.1002/jia2.25439] [Medline: 31909896]

21. Moher D, Liberati A, Tetzlaff J, Altman DG, PRISMA Group. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. PLoS Med 2009;6(7):e1000097 [Full text] [doi: 10.1371/journal.pmed.1000097] [Medline: 19621072]

22. Types of evaluation. Centers for Disease Control and Prevention. URL: https://www.cdc.gov/std/Programs/pupesdt/TyPes-20of%20Evaluation.pdf [accessed 2021-03-25]

23. Garett R, Menacho L, Young SD. Ethical issues in using social media to deliver an HIV prevention intervention: results from the HOPE Peru study. Prev Sci 2017;18(2):225-232 [Full text] [doi: 10.1007/s11121-016-0739-z] [Medline: 27933425]

24. Young SD, Cumberland WG, Nianogo R, Menacho LA, Galea JT, Coates T. The HOPE social media intervention for global HIV prevention in Peru: a cluster randomised controlled trial. Lancet HIV 2015;2(1):e27-e32 [Full text] [doi: 10.1016/S2352-3018(14)00006-X] [Medline: 26236767]

25. Harding K, Aryeetey R, Carroll G, Lasisi O, Pérez-Escamilla R, Young M. Breastfeed4Ghana: design and evaluation of an innovative social media campaign. Matern Child Nutr 2020;16(2):e12909 [Full text] [doi: 10.1111/mcn.12909] [Medline: 31867865]

26. Cao B, Saha PT, Leuba SI, Lu H, Tang W, Wu D, et al. Recalling, sharing and participating in a social media intervention promoting HIV testing: a longitudinal analysis of HIV testing among MSM in China. AIDS Behav 2019;23(5):1240-1249 [Full text] [doi: 10.1007/s10461-019-02392-0] [Medline: 30632008]

27. Sap S, Kondo E, Sobngwi E, Mbono R, Tatah S, Dehayem M, et al. Effect of patient education through a social network in young patients with type 1 diabetes in a Sub-Saharan context. Pediatr Diabetes 2019;20(3):361-365. [doi: 10.1111/pedi.12835]

28. Johns DJ, Langley TE, Lewis S. Use of social media for the delivery of health promotion on smoking, nutrition, and physical activity: a systematic review. Lancet 2017;390:S49. [doi: 10.1016/s0140-6736(17)32984-7]

29. Hutchinson P, Mirzoyants A, Leyton A. Empowering youth for social change through the Shujaaz multimedia platform in Kenya. Int J Adolesc Youth 2019;24(1):102-116 [Full text] [doi: 10.1080/02673843.2018.1475287]

30. Goldenhersch E, Thurl J, Ungaretti J, Rosencovich N, Waitman C, Cebiero MR. Virtual reality smartphone-based intervention for smoking cessation: pilot randomized controlled trial on initial clinical efficacy and adherence. J Med Internet Res 2020;22(7):e17571 [Full text] [doi: 10.2196/17571] [Medline: 32723722]

31. Cool CT, Clarevall MC, Hall JL, Taketani K, Zepeda JP, Gehner M, et al. Social media as a risk communication tool following typhoon Haiyan. Western Pac Surveill Response J 2015;6 Suppl 1:86-90 [Full text] [doi: 10.5365/WPSAR.2015.6.2.HYN_013] [Medline: 26767143]

32. Seiler et alJOURNAL OF MEDICAL INTERNET RESEARCH

33. Hamill S, Turk T, Murukutla N, Ghamrawy M, Mullin S. I ‘like’ MPOWER: using Facebook, online ads and new media to mobilise tobacco control communities in low-income and middle-income countries. Tob Control 2015;24(3):306-312. [doi: 10.1136/tobaccocontrol-2012-050946] [Medline: 24335477]

34. Chen J, Huang J, Ooi S, Lin L, Chen C, Liu Y, et al. Effect of flexible patterns of health education on enhancing the compliance of pregnant women from Tibet, China. Medicine (Baltimore) 2020;99(1):e18447 [Full text] [doi: 10.1097/MD.00000000000018447] [Medline: 31895773]

35. Mo D, Xiang M, Luo M, Dong Y, Fang Y, Yang S, et al. Using gamification and social incentives to increase physical activity and related social cognition among undergraduate students in Shanghai, China. Int J Environ Res Public Health 2019;16(5):858 [Full text] [doi: 10.3390/ijerph16050858] [Medline: 30857261]
35. Wu D, Huang W, Zhao P, Li C, Cao B, Wang Y, et al. A crowdsourced physician finder prototype platform for men who have sex with men in China: qualitative study of acceptability and feasibility. JMIR Public Health Surveill 2019;5(4):e13027 [FREE Full text] [doi: 10.2196/13027] [Medline: 3196245]

36. Ahmad N, Shariff ZM, Mukhtar F, Lye MS. Family-based intervention using face-to-face sessions and social media to improve Malay primary school children's adiposity: a randomized controlled field trial of the Malaysian REDUCE programme. Nutr J 2018;17(1):74 [FREE Full text] [doi: 10.1186/s12937-018-0379-1] [Medline: 30071855]

37. Cavalcanti DS, Cabral CS, de Toledo Vianna RP, Osório MM. Online participatory intervention to promote and support exclusive breastfeeding: randomized clinical trial. Matern Child Nutr 2019;15(3):e12806 [FREE Full text] [doi: 10.1111/mcn.12806] [Medline: 30825414]

38. Chen J, Ho E, Jiang Y, Whittaker R, Yang T, Bullen C. Mobile social network-based smoking cessation intervention for Chinese male smokers: pilot randomized controlled trial. JMIR Mhealth Uhealth 2020;8(10):e17522 [FREE Full text] [doi: 10.2196/17522] [Medline: 33095184]

39. Todorovic J, Terzic-Supic Z, Djikanovic B, Nesic D, Piperac P, Stamenkovic Z. Can social media intervention improve physical activity of medical students? Public Health 2019;174:69-73. [doi: 10.1016/j.puhe.2019.05.030] [Medline: 31323599]

40. Chai W, Zou G, Shi J, Chen W, Gong X, Wei X, et al. Evaluation of the effectiveness of a WHO-5A model based comprehensive tobacco control program among migrant workers in Guangdong, China: a pilot study. BMC Public Health 2018;18(1):296 [FREE Full text] [doi: 10.1186/s12889-018-5182-6] [Medline: 29486753]

41. Lwin MO, Vijaykumar S, Foo S, Fernando ON, Lim G, Panchapakesan C, et al. Social media-based civic engagement solutions for dengue prevention in Sri Lanka: results of receptivity assessment. Health Educ Res 2016;31(1):1-11 [FREE Full text] [doi: 10.1093/her/cvy065] [Medline: 26668207]

42. Pereira da Veiga CR, Semperebon E, da Silva JL, Lins Ferreira V, Pereira da Veiga C. Facebook HPV vaccine campaign: insights from Brazil. Hum Vaccin Immunother 2020;16(8):1824-1834 [FREE Full text] [doi: 10.1080/21645515.2019.1698244] [Medline: 31916905]

43. Gamboa J, Lamb MM, de la Cruz P, Bull S, Olson D. Using social media to increase preventative behaviors against arboviral diseases: a pilot study among teens in the Dominican Republic. Mhealth 2019;5:30 [FREE Full text] [doi: 10.21037/mhealth.2019.07.03] [Medline: 31559275]

44. Januraga PP, Izwardi D, Crosita Y, Indrayathi PA, Kurniasari E, Sutrisna A, et al. Qualitative evaluation of a social media campaign to improve healthy food habits among urban adolescent females in Indonesia. Public Health Nutr 2021;24(24):s98-107. [doi: 10.1017/S1368980020002992] [Medline: 32907648]

45. Thammasarm K, Banchonhattakit P. Effects of food fit for fun program with social media used on health literacy and obesity prevention behaviors among senior-primary school students, in Nakhon Ratchasima province Thailand. Indian J Public Health Res Dev 2020;11(7):1291-1297. [doi: 10.37506/ijphrd.v11i7.10274]

46. He C, Wu S, Zhao Y, Li Z, Zhang Y, Le J, et al. Social media-promoted weight loss among an occupational population: a randomised controlled trial. J Med Internet Res 2022;24(S2):s98-107. [doi: 10.21037/mhealth.2019.07.03] [Medline: 32907648]

47. de Souza CT, de Santana CS, Ferreira P, Nunes JA, de Lourdes Benamor Teixeira M, da Silveira Gouveia MI. Caring in the age of COVID-19: lessons from science and society. Cad Saude Publica 2020;36(6):e00115020 [FREE Full text] [doi: 10.1590/0102-311X00115020] [Medline: 32609168]

48. Chiu CJ, Menacho L, Fisher C, Young SD. Ethics issues in social media-based HIV prevention in low- and middle-income countries. Camb Q Healthc Ethics 2015;24(3):303-310 [FREE Full text] [doi: 10.1017/S0963180114000620] [Medline: 26059956]

49. Chiu CJ, Menacho L, Young SD. The association between age and ethics-related issues in using social media for HIV prevention in Peru. Ethics Behav 2016;26(2):99-109 [FREE Full text] [doi: 10.1080/10508422.2014.991868] [Medline: 27034609]

50. Purdy CH. Using the internet and social media to promote condom use in Turkey. Reprod Health Matters 2011;19(37):157-165. [doi: 10.1016/S0968-8080(11)37549-0] [Medline: 21550996]

51. Parsapure R, Rahimiforushani A, Majlesi F, Montazeri A, Sadeghi R, Garmarudi G. Impact of health-promoting educational intervention on lifestyle (nutrition behaviors, physical activity and mental health) related to vaginal health among reproductive-aged women with vaginitis. Iran Red Crescent Med J 2016;18(10):e37698 [FREE Full text] [doi: 10.5812/ircmj.37698] [Medline: 30071855]

52. Hu, et al. Caring in the age of COVID-19: lessons from science and society. Cad Saude Publica 2020;36(6):e00115020 [FREE Full text] [doi: 10.1590/0102-311X00115020] [Medline: 32609168]

53. Hutchinson P, Leyton A, Meekers D, Stoecker C, Wood F, Murray J, et al. Evaluation of a multimedia youth anti-smoking and girls' empowerment campaign: SKY Girls Ghana. BMC Public Health 2020;20(1):1734 [FREE Full text] [doi: 10.1186/s12889-020-09837-5] [Medline: 33203403]

54. Diamond-Smith N, Holton AE, Francis S, Bernard D. Addressing anemia among women in India-an informed intervention using Facebook Ad Manager. Mhealth 2020;6:39 [FREE Full text] [doi: 10.21037/mhealth-19-237a] [Medline: 33437835]
55. Chang L, Chattopadhyay K, Li J, Xu M, Li L. Interplay of support, comparison, and surveillance in social media weight management interventions: qualitative study. JMIR Mhealth Uhealth 2021;9(3):e19239 [FREE Full text] [doi: 10.2196/19239] [Medline: 33646130]

56. Evans WD, Harrington C, Patchen L, Andrews V, Gaminian A, Ellis LP, et al. Design of a novel digital intervention to promote healthy weight management among postpartum African American women. Contemp Clin Trials Commun 2019;16:100460 [FREE Full text] [doi: 10.1016/j.conctc.2019.100460] [Medline: 31650078]

57. Bluethmann SM, Bartholomew LK, Murphy CC, Vernon SW. Use of theory in behavior change interventions. Health Educ Behav 2017;44(2):245-253 [FREE Full text] [doi: 10.1177/1090198116647712] [Medline: 27226430]

Abbreviations

LMIC: low- and middle-income country
PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

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