

# Interactive social media interventions to promote health equity: an overview of reviews

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## Abstract

**Introduction:** Social media use has been increasing in public health and health promotion because it can remove geographic and physical access barriers. However, these interventions also have the potential to increase health inequities for people who do not have access to or do not use social media. In this paper, we aim to assess the effects of interactive social media interventions on health outcomes, behaviour change and health equity.

**Methods:** We conducted a rapid response overview of systematic reviews. We used a sensitive search strategy to identify systematic reviews and included those that focussed on interventions allowing two-way interaction such as discussion forums, social networks (e.g. Facebook and Twitter), blogging, applications linked to online communities and media sharing.

**Results:** Eleven systematic reviews met our inclusion criteria. Most interventions addressed by the reviews included online discussion boards or similar strategies, either as stand-alone interventions or in combination with other interventions. Seven reviews reported mixed effects on health outcomes and healthy behaviours. We did not find disaggregated analyses across characteristics associated with disadvantage, such as lower socioeconomic status or age. However, some targeted studies reported that social media interventions were effective in specific populations in terms of age, socioeconomic status, ethnicities and place of residence. Four reviews reported qualitative benefits such as satisfaction, finding information and improved social support.

**Conclusion:** Social media interventions were effective in certain populations at risk for disadvantage (youth, older adults, low socioeconomic status, rural), which indicates that these interventions may be effective for promoting health equity. However, confirmation of effectiveness would require further study. Several reviews raised the issue of acceptability of social media interventions. Only four studies reported on the level of intervention use and all of these reported low use. More research on established social media platforms with existing social networks is needed, particularly in populations at risk for disadvantage, to assess effects on health outcomes and health equity.

**Keywords:** *social media, disadvantaged populations, public health, health promotion, health equity*

## Introduction

Social media is increasingly used for public health and health promotion: 60% of state

departments in the United States use one or more social media applications;<sup>1</sup> the Public Health Agency of Canada has a presence on social media sites including Twitter

## Highlights

- The use of social media interventions has been increasing in the field of public health as they can cross geographical and physical access barriers.
- Eleven systematic reviews found mixed effects of social media interventions on improving health outcomes and healthy behaviours.
- Some of the reviewed studies found benefits from social media interventions while others found no change or found that outcomes were worse than those from non-social media interventions.
- We know little about how the design and implementation features and the intensity and duration of interventions could improve health or whether they could increase negative behaviours, stigmatization or exacerbation of health inequities.
- Many of the studies used social media platforms that were developed by the researchers. The effects of using existing social networks with commercial platforms, such as Facebook and Twitter, as part of social media health interventions are unknown.

(2300 tweets, over 52 000 followers as of January 14, 2015)<sup>2</sup> and Facebook (over 13 000 ‘likes’ as of January 14, 2016)<sup>3</sup>; and 34 out of the 36 public health units in Ontario<sup>4</sup> are using social media. Social media holds promise for public health interventions reaching a wide number of people as over 60% of adults and 90% of youth with Internet access in Canada are active on one or more forms of social media.<sup>5,6</sup>

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Various social media can be defined by the extent to which they focus on seven functional building blocks to do with the degree of interaction and communication among users: 1) identity: the extent to which users reveal themselves; 2) conversations: the extent to which users communicate with each other; 3) sharing: the extent to which users exchange, distribute and receive content; 4) presence: the extent to which users know if others are available; 5) relationships: the extent to which users relate to each other; 6) reputation: the extent to which users know the social standing of others and content; and 7) groups: the extent to which users form communities.<sup>7</sup>

Evidence from systematic reviews suggests social media that facilitates interaction with other users by way of bulletin boards, chat-rooms or available networking sites (e.g. Twitter and Facebook) effectively improves knowledge. However, effects on health behaviours (e.g. smoking, eating, physical activity) and health outcomes (such as weight loss and mental health) have been found to be both positive and negative.<sup>8-12</sup> While the social media interventions in these reviews were mostly assessed in well-educated, higher-income populations, some studies have shown benefits for low-income populations, older adults, youth and different ethnocultural groups.

However, mass media strategies for public health also have the potential to increase health inequities, defined as differences in health outcomes that are avoidable and unfair.<sup>13,14</sup> Differences in access to technology and cultural differences and preferences might affect uptake and use of social media interventions and may also result in health inequities.

In this paper, we aim to assess the effects of interactive social media interventions for health communication on health outcomes, behaviour change and health equity by overviewing systematic reviews.

## Methods

### Approach

We defined the review question using the population, intervention, comparator, outcome (PICO) approach.<sup>15</sup>

### Population

We included systematic reviews of any population exposed to a social media intervention.

### Intervention

We defined social media as “activities among people gathered online who share information using conversational media that make it easy to create and share content in the form of words, pictures, videos, and audios.”<sup>16</sup> As mentioned previously, different types of social media can be defined by the extent to which they focus on seven functional building blocks.<sup>7</sup> Social media includes activities such as discussion forums, social networks (e.g. Facebook and Twitter), blogging and micro-blogging, bookmarking and media sharing.<sup>17</sup> To distinguish from other web-delivered programs and to qualify as social media for the purposes of this review, an intervention needed to have an interactive component with two-way communication between peers or between the website and users.

We excluded mass media and any unidirectional forms of health communication (e.g. where the Internet or text messages are used to broadcast messages with no interactive component). We also excluded e-health interventions that involved using technology to deliver health care (e.g. using remote consultation between a patient and a provider through the Telestroke network).<sup>18,19</sup> We excluded smartphone applications if they lacked an interactive component with other users (e.g. feedback or tracking of weight on a smartphone for personal use only with no sharing or feedback from other users/peers).

### Comparator

We included comparators of usual care, no intervention, or another intervention method that may have had a social media component. Usual care could include any type of health care or health promotion activity. We kept the comparator broad so we could compare this to any other method of delivering health promotion or health care for the same condition.

### Outcomes

We included systematic reviews that reported on at least one of the following primary outcomes: physical outcomes (e.g.

weight change, functional status), psychosocial health outcomes (e.g. quality of life and self-efficacy), satisfaction, behaviour change and adverse effects (e.g. addiction, depression). We collected and reported data on secondary outcomes of attitudes and knowledge. We documented process measures such as quality of communication, knowledge, reach, engagement and fidelity of the intervention (whether the intervention was implemented as planned).<sup>20</sup>

To assess the outcome of health equity, we determined whether results were presented separately across characteristics associated with privilege/disadvantage. We also assessed whether the intervention was aimed at a disadvantaged population, which could potentially improve health equity. We used the acronym PROGRESS-Plus to identify these characteristics, defined as Place of residence, Race/ethnicity/culture/language, Occupation, Gender/sex, Religion, Education, Socioeconomic status, Social capital or other factors associated with privilege/disadvantage such as age (e.g. children or elderly), sexual orientation, and disease status.<sup>21</sup>

### Study design

We conducted a rapid response overview of systematic reviews approach. A rapid response provides an overview of the available evidence, usually from guidelines or systematic reviews, in response to a need or priority identified by a knowledge user in a short timeframe.<sup>22,23</sup> An a priori protocol was developed and submitted to the Public Health Agency of Canada as a Statement of Work (available from the authors on request). We defined a systematic review as a systematic and transparent synthesis of eligible studies, with transparent methods and an explicit search strategy. We included reviews of randomized controlled trials, non-randomized studies and qualitative studies.

### Search methods for identification of studies

We designed a sensitive search strategy to retrieve systematic reviews from electronic bibliographic databases. Our knowledge user advised us to avoid a grey literature search because of time constraints. To retrieve systematic reviews, we used the Montori filter, a validated systematic review

study design filter.<sup>24</sup> No date limitations or language restrictions were applied.

We identified 4580 items from the following databases on 27 February 2014:

- MEDLINE via OVID (1946\* to 27 February 2014);
- PsycINFO via OVID (PsycINFO 1806 to February Week 3 2014);
- Cochrane Library via Wiley (Issue 2 of 12, 2014) including the Cochrane Database of Abstracts of Reviews of Effects (DARE), Cochrane Database of Systematic Reviews (CDSR), Health Technology Assessment (HTA) and Economic Evaluations Database (EED) to scan the reference lists of relevant systematic reviews;
- PUBMED via National Library of Medicine “Related Articles” search in PUBMED using 4 relevant systematic reviews as seed papers, 27 February 2014; and
- Campbell Library (hand searched all issues, 2004–present).

The search strategy was devised in OVID MEDLINE by a librarian scientist (TR) and peer reviewed by another member of the

team (JPP) following PRESS (Peer Review of Electronic Search Strategies) guidelines.<sup>25</sup> The strategy was then adapted for the other databases. The complete search strategies are available upon request.

All databases were searched from inception to 27 February 2014. Duplicates were removed electronically using EndNote, leaving 4102 citations.

### Inclusion criteria

We included reviews if they assessed the effects of social media health promotion interventions (description of eligible social media interventions described in Table 1) on health behaviour or health outcomes.

### Data extraction

We extracted data on the following:

- intervention description;
- comparator;
- outcomes;
- review exclusion criteria;
- number of included studies;

- number of participants in intervention and control groups (enrolled and completed);
- country setting;
- population description including median age and percentage of females;
- description of population, analysis or interpretation by PROGRESS-Plus;
- outcome – summary and quantitative pooled result (if available);
- usage of social media (how much participants used the intervention), reach of the intervention and activities to increase engagement of the participants with the intervention (e.g. use of a moderator);
- confounders;
- adverse effects;
- risk of bias;
- applicability for PROGRESS-Plus populations discussed; and
- AMSTAR score.

### Quality assessment of reviews

We used the AMSTAR tool ([http://amstar.ca/Amstar\\_Checklist.php](http://amstar.ca/Amstar_Checklist.php)) to assess the quality of the systematic reviews.<sup>26</sup> We considered systematic reviews to be of high quality when they addressed all 11 items on the AMSTAR checklist.

**TABLE 1**  
**Definition of social media interventions**

Social media format	Included	Excluded
Blogs and microblogs (e.g. Twitter)	If the intervention includes multi-way interaction	One-way messages and posts or direct contact with a health care provider
Content communities (e.g. YouTube, Pinterest)	If the intervention includes multi-way interaction	One-way messages and posts or direct contact with a health care provider
Discussion groups (e.g. chat rooms, online bulletin boards, discussion forums)	Synchronous or asynchronous discussion groups or boards	One-way messages and posts or direct contact with a health care provider
Emails	List serves that allow for communication, discussion and visible record of the discussion for others to view and comment	One-way emails (e.g. reminders)
Mobile applications (apps)	Apps that allow for communication and interaction with a group of people	Apps that allow a person to track and monitor their progress (e.g. weight loss, blood sugar, etc.) without a social component or apps used to communicate with a health care provider
SMS/text messages	If the messages remain posted for others to view	One-way text messages (e.g. reminders) or text messages with reply and/or feedback from health care provider/researchers
Virtual gaming worlds	If there is communication between multiple players (and there is a health outcome)	Online games without social and health components
Virtual social networks (e.g. Facebook)	If the intervention includes multi-way interaction	One-way messages and posts or direct contact with a health care provider
Webpages and Wikis	If the website/Wiki allows for multi-way interaction	One-way communication (e.g. education)

\*Since there is no definitive date when social media phenomenon began, we chose not to apply a date limit. Instead, we focussed on search terms that describe the social media intervention and retrieved relevant material regardless of the date of publication.

## Synthesis methods

The interventions and populations were too heterogeneous to pool results. We narratively summarized effects on participant-important outcomes for each type of intervention as well as process outcomes, including the fidelity of the intervention and reach and level of engagement (if measured) using effect sizes (if reported). We checked the extent to which the primary studies in the eligible systematic reviews were overlapping. Dichotomous outcomes are presented as relative risks, and continuous outcomes as weighted mean differences. We report the pooled results from systematic reviews that combined results statistically.

## Health Equity Impact Assessment

We used the Ontario Ministry of Health and Long-Term Care Health Equity Impact Assessment (HEIA) tool (available at: <http://www.health.gov.on.ca/en/pro/programs/hea/>) to assess likely intended and unintended effects in priority populations (completed template available from the authors on request). To make these judgments about unintended effects and mitigation strategies, two from our team of researchers (JP, VW) reviewed data on Internet access and also considered known barriers and facilitators for specific populations based on our expertise in reviewing effects of interventions on health equity.<sup>21,27</sup> The HEIA tool is intended to help identify how a program, policy or other initiative will impact different groups of the population, the primary focus being barriers in access to programs.<sup>28</sup> We used data on access and use of social media platforms from the Canadian Internet Use Survey to measure access to Internet and Internet use behaviour (survey results available upon request).

## Results

### Results of search

The search strategy identified 4103 records after duplicates were removed. After screening abstracts and titles, 3957 records were excluded and 146 articles were retrieved for full-text screening. We excluded

135 systematic reviews because the interventions used one-way communication (e.g. one-way reminders for appointments) or used the Internet for treatment (e.g. cognitive-based therapy by Internet) or for one-way education or information messages, with no interaction among users or user-generated content (see Figure 1). A table of excluded studies is available upon request.

We included 11 systematic reviews in this overview (see Table 2 for the characteristics of these studies).

### Description of reviews

Most of the systematic reviews focussed on online discussion boards or similar strategies, either as stand-alone interventions or in combination with other interventions. Only three reviews included studies that used the most common social media tools, Facebook (n = 19 unique studies) and Twitter (n = 9 unique studies).<sup>8,9,30</sup> Although they were included in the search criteria, none of the interventions in the systematic reviews were defined as mobile phone applications.

In the older studies included in the reviews, most of the discussion boards were “closed” spaces, where only study participants could access the discussion board (i.e. there was no interaction with external people or communities). For example, in the Chang et al. review<sup>9</sup> of online weight management using social media, 85% of the studies used a closed, researcher-developed website.

In the studies where social media was part of a complex intervention, it focussed on maintaining engagement with the other components of the intervention, to provide feedback on the intervention and a space to formulate questions and get answers. For example, in the Williams et al. review,<sup>30</sup> all of the 16 studies had social media as a component of a complex intervention where other components included websites with fact sheets and information or therapist-led email interactions.

In the 11 systematic reviews included, the populations were diverse in terms of age

(children, youth, adults and older people), disease conditions (e.g. cancer, cardiovascular, asthma, depression, eating disorders) and sex/gender (i.e. no exclusion criteria related to sex/gender). One large systematic review of 98 studies of social media interventions for a broad range of health promotion activities included diverse populations in terms of ethnicity, socioeconomic status, age and education.<sup>8</sup>

### Effects of social media interventions

We could not combine results to generate pooled meta-analyses. The results of each review are summarized in Table 3. We have reported effect sizes and confidence intervals when these have been available.

Of the 11 included reviews, seven reported mixed effects on health outcomes and health behaviours (details below). The remaining four reported benefits such as satisfaction, finding information and social support.<sup>8,31-33</sup>

### Knowledge

The review by Newton & Ciliska<sup>12</sup> (AMSTAR score 7) reported on knowledge outcomes and found “a statistically significant increase in knowledge” about healthy lifestyle attitudes and behaviours.

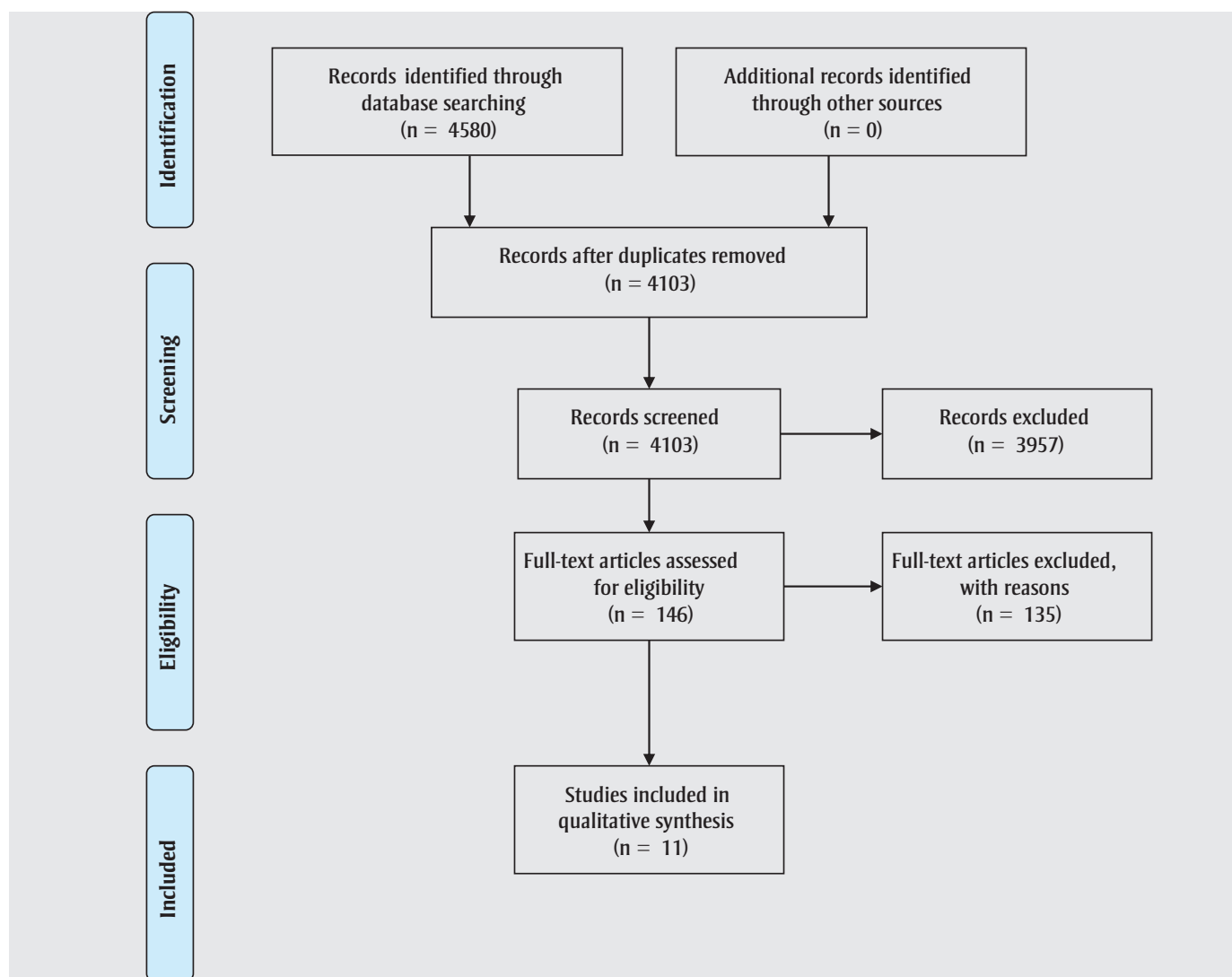
### Weight loss

A review by Williams et al.<sup>30</sup> (AMSTAR score 9) pooled nine studies of social media interventions aimed at weight loss and found no difference between social media and control groups (weight 0.00 kg; 95% CI: -0.19 to 0.19 kg). However, another review, by Chang et al.<sup>9</sup> (AMSTAR score 5) included five of the same studies as Williams et al.<sup>30</sup> and reported that nine studies showed greater weight loss with the social media intervention than in the control group, but four studies showed no effect and two showed less weight loss among the social media group than those receiving face-to-face interventions. A third review, by Eysenbach et al.<sup>34</sup> (AMSTAR score 6), found “mixed but mostly non-significant” effects of social media on weight outcomes.

### Behaviour change: physical activity

The review by Chang et al.<sup>9</sup> (AMSTAR score 5) reported that two studies showed

**FIGURE 1**  
PRISMA 2009 flow diagram<sup>29</sup> showing the selection process to identify relevant systematic reviews



an increase in self-reported physical activity and three studies showed no difference in physical activity. Williams et al.<sup>30</sup> (AMSTAR score 9) conducted a meta-analysis of 12 studies and reported an increase in physical activity among the social media group (SMD 0.13; 95% CI: -0.04 to 0.30).

#### Behaviour change: diet

A review by Medina et al.<sup>32</sup> (AMSTAR score 3) examined online social media platforms for people with cardiovascular disease and described improved diet and quality of life among those using these platforms. The review by Chang et al.<sup>9</sup> (AMSTAR score 5) included one study that found “no statistically significant differences” in body mass index

(BMI), waist-to-hip ratio, blood pressure or cholesterol following a dietary intervention.

#### Behaviour change: smoking

The review by Eysenbach et al.<sup>34</sup> (AMSTAR score 6) reported a higher rate of smoking cessation in a peer-to-peer online support group compared to a group without peer-to-peer support. However the rates in the peer-to-peer online plus psychoeducational intervention were similar to the group receiving a psychoeducational intervention alone.

#### Health care utilization

One study in the review by Medina et al.<sup>32</sup> (AMSTAR score 3) reported that the number of medical visits “decreased mildly” following an online support group intervention

using a moderator. However, this did not persist in the second phase once the moderator was removed.<sup>32</sup> The Eysenbach et al.<sup>34</sup> review (AMSTAR score 6) included three studies that reported on health care utilization. One study within this review reported fewer calls to doctors following the social media intervention while another found an increase in calls to providers (effect sizes not provided but authors report  $p < .05$ ).

#### Mental health outcomes

The Lai et al.<sup>31</sup> review (AMSTAR score 6), which included four studies with social media components, found that Internet-based cognitive behaviour therapy with social media interventions (online message board or support groups) reduced

**TABLE 2**  
**Characteristics of included studies—interventions, populations and outcomes**

Citation	Population	Intervention	Eligibility criteria	Target outcome (length of follow-up)	Number of studies (number of studies with social media components)	Types of eligible studies	Country (number of studies)	AMSTAR score
Chang et al., 2012 <sup>9</sup>	Individuals of all ages using social media for weight management	Most interventions were message boards or chat rooms designed by the researchers; 2 studies used Facebook and one used Twitter	Report weight-related outcomes, include a social media component (web-based application that allow interaction in a virtual community)	Weight management (6 to 12 months)	20 (20)	RCT	USA (n = 14), Australia (n = 3), Canada (n = 2), UK (n = 1)	5
Eysenbach et al., 2004 <sup>34</sup>	Various e.g. pregnant women, caregivers of people with Alzheimer disease, adults with diabetes, people with AIDS, young single mothers, adult smokers, etc.	Virtual communities, web-based discussion forums, chat rooms, mailing list, voice bulletin board that involved peer-to-peer interaction	Interventions needed to be a virtual community or have a virtual community component (a group of individuals who interact publicly through a computer communication network or other computer-based tool); focus broadly on health or health care issues; have outcomes that relate to knowledge, health, psychological or social outcomes, health service use include a control group	Health and social outcomes (10 weeks to 12 months)	38 (38)	RCT, CBA	Not reported	6
Griffiths, 2009 <sup>39</sup>	Adults and adolescents; some participants with cancer, depression, chronic illness, HIV; caregivers	Internet support groups (e.g. bulletin boards, chatrooms or mailing lists, either alone or in combination)	Interventions included an online peer-to-peer support group; had a depression outcome; involved a unipolar depression Internet support group	Depression (12 weeks to 12 months)	28 (10)	RCT, pre-post, case series, cross-sectional, ITS	USA (n = 23), Europe (n = 4), Australia (n = 1)	9
Hong et al., 2012 <sup>35</sup>	Adult cancer survivors	Online cancer support (e.g. websites, online forums, listservs, bulletin boards)	Interventions needed to use online cancer support or resources and report outcome measures to do with psychological, physical, information attainment, etc., focus on adult cancer survivors	Psychological, physical, information attainment outcomes (1 to 12 months)	24 (21)	RCTs, pre-post, qualitative reports	Not reported	3
Lai et al., 2014 <sup>31</sup>	Mostly adults	Web-based suicide prevention- including any intervention delivered by Internet (e.g. cognitive behavioural therapy, online support groups, message board)	Web-based suicide prevention strategies with a discussion of the efficacy, benefits or challenges of the intervention	Suicidal ideation (6 weeks to 12 months)	15 (4)	RCTs, pre-post case series, cohort, cross-sectional, qualitative, descriptive reports	USA	6
Medina et al., 2013 <sup>32</sup>	Adults with cardiovascular disease	Online support group for people with cardiovascular disease (both moderated and unmoderated groups included)	Online support groups, patients with cardiovascular disease	Benefits and negative outcomes (1 study: 9 months; others: not reported)	4 (4)	CBA, cohort	USA (n = 3), UK (n = 1)	3

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TABLE 2 (continued)  
 Characteristics of included studies—interventions, populations and outcomes

Citation	Population	Intervention	Eligibility criteria	Target outcome (length of follow-up)	Number of studies (number of studies with social media components)	Types of eligible studies	Country (number of studies)	AMSTAR score
Moorhead et al., 2013 <sup>8</sup>	Mixed, from schoolchildren to older adults, various education, socioeconomic status, ethnicity	Communication between the general public and/or patients and/or health professionals about health issues using social media (Facebook (n = 13), blogs (n = 13), Twitter (n = 8), YouTube (n = 7), myspace (n = 5), Patients LikeMe (n = 4) and other types of social media (n = 53))	Interventions needed to focus primarily on all communication interactions within and between the general public and/or patients and/or health professionals about health issues using social media, including uses, benefits or limitations of social media for health communication	Use, benefits or limitations of social media (not reported)	98 (98)	RCTs, network analyses, cross-sectional, qualitative, descriptive reports, secondary data analyses	Mostly high income (not reported)	5
Nef et al., 2013 <sup>33</sup>	Older than 55 years	Social networking sites	Needed to include social media intervention for people 55 years and older	Acceptance, harms (mental health) (2 studies reported follow-up: 7 weeks and 21 weeks)	18 (18)	CBA, cohort	High income; not specified for each study	3
Newton & Ciliska, 2006 <sup>12</sup>	Grade 10 and undergraduate students. Median age range 15–20 years	All studies used the program "student bodies," which includes psychoeducational readings and reflection, Internet-based body image journal, asynchronous online discussion group	Interventions evaluating Internet-based prevention programs (guided or non-guided, synchronous or asynchronous, individual or group format)	Disordered eating attitudes/behaviours (10 to 24 weeks)	5 (5)	RCT, CBA	US (all California)	7
Nieto et al., 2008 <sup>40</sup>	Adults (median ages 45.5 and 47)	Internet support groups (e.g. email discussion lists)	Studies that evaluated the effectiveness of any treatment for patients with chronic pain using new information and communication technologies	Pain (3 to 12 months)	7 (2)		USA (n = 1), 1 not reported	3
Williams et al., 2014 <sup>30</sup>	16 studies in adults, 6 included children and youth. 70% female in 10 studies with both sexes, 6 studies of women only	Online discussion boards allowing for the exchange of user-generated content	Social media interventions promoting healthy diet and exercise in the general population	Physical activity and diet behaviour (10 weeks to 24 months)	16 (16)	RCTs	USA (n = 10), Australia (n = 3) and 3 in other countries	9

Abbreviations: CBA, controlled before–after study; ITS, interrupted time series; RCT, randomized controlled trial.

suicidal ideation (effect sizes ranged from  $d = 0.04$ – $0.45$ ).

The review by Hong et al.<sup>35</sup> (AMSTAR score 3) studied the effects of Internet-based groups on depression among cancer

survivors, principally breast cancer survivors. Participants valued the Internet-based tools positively, and most of the studies found a positive effect of social media groups. However, for the few interventions that were compared to another

type of program (e.g. a face-to-face program), the social media intervention had similar results or was less effective (e.g. one study reported higher depression rates among the social media group than the face-to-face group).

**TABLE 3**  
**Results of included systematic reviews**

Citation	Desirable outcomes	Harms or limitations	Usage, reach engagement	Conclusions of the review
Chang et al., 2012 <sup>9</sup>	<ul style="list-style-type: none"> <li>• Inconsistent effect on BMI and weight; concluded that few studies quantified effect</li> <li>• Inconsistent effect on physical activity levels (2 positive, 3 negative)</li> </ul>	<ul style="list-style-type: none"> <li>• Use of social media was low (25%), and 85% of studies used researcher-developed platforms that may not be as user-friendly and vibrant and connected to large community of users</li> <li>• Use of social media for weight management may reduce positive feelings associated with social media use</li> </ul>	25% of users reported using social media sites	“We found that social media is being incorporated in online weight-management interventions largely through message boards and chat rooms with unclear benefits.”
Eysenbach et al., 2004 <sup>34</sup>	<ul style="list-style-type: none"> <li>• Weight loss or healthy body weight: mixed but mostly nonsignificant results</li> <li>• Behaviour change: Of the 6 studies that looked at this outcome, abstinence rates were higher with peer support in 1, study and similar in the group with full psychoeducational intervention</li> <li>• Only 3 studies out of 12 looking at depression and social support reported an improvement</li> <li>• Effects for social support measures were mixed: some indicating significant effects and others not</li> <li>• 5 studies looked at glycosylated hemoglobin and only 1 showed significant improvement</li> <li>• Of the 3 studies of health care utilization, 1 reported a significant decrease, 2 reported increase in phone calls to providers</li> </ul>	No adverse effects reported. The authors saw little commercial or professional interest in evaluating pure virtual communities. Studies investigating "natural" self-help are difficult to recreate in controlled setting as participants may have an intrinsic desire to participate in virtual communities and general recruitment may not capture the right population	Some studies found virtual community component not heavily used	“In view of the wide variation in interventions, measurement tools, and populations studied, and the lack of methodological rigour in the majority of studies reviewed, the effect of online support groups on health-related outcomes and health care resource use remains unclear.”
Griffiths 2009 <sup>39</sup>	<ul style="list-style-type: none"> <li>• 3 of 4 multicomponent trials reported a reduction in symptoms of depression while 1 found no effect</li> <li>• The non-experimental studies had mixed findings</li> <li>• Multicomponent studies were significantly less likely to yield positive outcomes than stand-alone interventions</li> <li>• Outcome was not affected by the use of synchronous (chat room) compared to asynchronous (bulletin board, listserv/newsgroups) Internet support groups, whether or not the study reported using a moderator or whether the board was public, research and/or restricted access</li> </ul>	No adverse effects reported	Not reported	“There is a need for high-quality research to investigate the effect of [Internet support groups] on depression outcomes.”
Hong et al., 2012 <sup>35</sup>	<ul style="list-style-type: none"> <li>• Most studies reported positive effects of online support but none of the RCTs reported significant positive outcomes, e.g. no positive improvement in mood, adjustment to cancer, self-related health status, health-related QOL</li> <li>• 1 of the 4 RCTs reported improvements in emotional well-being but results for psychological well-being were mixed (1 study reported improvements while 1 reported more psychological distress in the intervention group)</li> </ul>	1 study reported more psychological distress in the intervention group. The studies didn't include online cancer support resources such as Facebook. Limited number of studies	Not reported	“Preliminary but inconclusive evidence of positive outcomes”

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**TABLE 3** (continued)  
**Results of included systematic reviews**

Citation	Desirable outcomes	Harms or limitations	Usage, reach engagement	Conclusions of the review
Lai et al., 2014 <sup>31</sup>	No quantitative measure of benefits on suicidal ideation; 2 papers reported positive feedback from users who were in crisis	<ul style="list-style-type: none"> <li>• Risk of low-quality information (only half evidence-based), possible breaches of confidentiality, and limits to access may not match cultural background of user</li> <li>• Risk of non-genuine messages (&lt; 5% in one online support group)</li> <li>• Risk of "flaming" effect of hostile comments</li> <li>• Risk of Internet addiction, limited to literate clients</li> <li>• Possible safety concerns in acute crises</li> </ul>	Not described	"Preliminary evidence that suggests the probable benefit of web-based strategies in suicide prevention"
Medina et al., 2013 <sup>32</sup>	Mutual support, support seeking as self-help, support given as stored currency, moderating information, dilemma of sharing, support as bad debt, reduced medical visits, reduced isolation, improved QOL (qualitative data/themes), and increased hope	<ul style="list-style-type: none"> <li>• Dissatisfaction or frustration of not finding what they wanted</li> <li>• Risk for socially sensitive people, risk of lack of moderation of content, risk of unreliable data</li> </ul>	Not described	"Online support groups are a large repository of quality information related to general and specific diseases, such as cardiovascular diseases, and an appropriate environment to foster or create a support community between participants."
Moorhead et al., 2013 <sup>8</sup>	<ul style="list-style-type: none"> <li>• Increased interactions with others</li> <li>• More available, shared and tailored information</li> <li>• Increased accessibility and widening access to health information</li> <li>• Peer/social/emotional support</li> <li>• Public health surveillance</li> <li>• Potential to influence health policy</li> </ul>	No adverse effects reported. Limitations included poor reliability, quality concerns, lack of privacy, unaware of risks of disclosure, harmful or incorrect advice, information overload, not sure how to apply information to personal situation, some media more effective for behaviour change, adverse health, negative health behaviours, deter people from visiting their health professionals	Not described, but some disparities in use need further investigation (e.g. more female users). Helpful as social/emotional support, particularly with connections where ties are strong, peer-to-peer interaction, one-sided/imbalance for professionals in professional-to-patient interactions needs to be managed, reliability/quality of social media is unregulated	"Although there are benefits to using social media for health communication, the information needs to be monitored for quality and reliability, and the users' confidentiality and privacy need to be maintained"
Nef et al., 2013 <sup>33</sup>	Main benefit was knowing what was going on in younger family members' lives	No mental health harms identified nor increases in loneliness. Barriers described were lack of privacy; did not understand purpose of social media sites, technology was not user-friendly	Described as low acceptance and use	"Social networking sites have the potential to support today's and tomorrow's communication between older and younger family members"
Newton & Ciliska, 2006 <sup>12</sup>	No difference in effect for eating disorder inventory or eating disorder examination questionnaire	None reported but the authors mention that an ethical concern for Internet-based interventions is the inability to detect and address serious eating disorder symptoms that could be detected in a face-to-face encounter	Completion in the intervention group ranged from 77%–92%	"No conclusive statements can be made regarding the impact of Internet prevention programs."
Nieto 2008 <sup>40</sup>	The results were not aggregated. Both studies found positive results	No adverse effects reported	Not reported	"In general the results of the studies reviewed demonstrate that treatments based on new technologies are effective and efficient and that patients hold positive attitudes toward them."
Williams et al., 2014 <sup>30</sup>	Weight not statistically significantly different in 10 studies: SMD 0.00 (95% CI: -0.19 to 0.19). Levels of physical activity not statistically significantly different: SMD 0.13 (95% CI: -0.04 to 0.30), 12 studies	No adverse effects reported (but high dropout rate from intervention group). The authors reported some risks of confidentiality, cultural differences, hostile comments, fake messages, safety concerns in crises	23% of intervention group completed the study	"Despite its growing popularity, there is little evidence that social media interventions demonstrate a significant benefit for improving healthy diet and exercise."

**Abbreviations:** BMI, body mass index; CBA, controlled before–after study; CI, confidence interval; QOL, quality of life; RCT, randomized controlled trial; SMD, standardized mean difference.

## Potential harms

Harms or adverse effects were not quantified in any of the systematic reviews. Most of the studies included in the reviews reported dropout rates of 20% or more.<sup>9,30</sup> The reasons for these attrition rates were not explored in the primary studies.

The reviews described possible harmful effects such as missed symptoms, concerns about quality of care, increased stress, dissatisfaction, privacy concerns and loneliness. Newton & Ciliska<sup>12</sup> raised the ethical concern that Internet-based interventions may miss serious symptoms that would have been detected in face-to-face encounters. Lai et al.<sup>31</sup> raised concerns about the quality of information provided for users of social media, a lack of confidentiality and the inability of counsellors and moderators to react on a timely manner to crises. In a qualitative analysis, Medina et al.<sup>32</sup> described participants' frustration or dissatisfaction due to misdiagnoses or lack of information or support as a limitation of social media. Nef et al.<sup>33</sup> (AMSTAR score 3) did not find any reported harms on mental health or loneliness, but described concerns among older adults about privacy and inappropriate content. Moorhead et al.<sup>8</sup> (98 included studies, AMSTAR score 5) mentioned poor reliability and quality of the health care information and lack of privacy as possible harms. None of the reviews reported an increase in negative or unhealthy behaviours.

## What evidence was available on health equity?

The reviews we included did not present disaggregated analyses across characteristics associated with disadvantage. Three reviews suggested that results may be applicable to diverse populations, based on their findings, as follows:

- no difference between youth and adults in effectiveness of social media on healthy diets, behaviours and physical activity;<sup>30</sup>
- participants with lower baseline social support or social capital were more likely to use social media;<sup>9</sup> and
- social media users were disproportionately from lower-income households.<sup>8</sup>

Nef et al.<sup>33</sup> assessed qualitative studies of Internet use by older adults (people

≥ 55 years) and reported that the Internet helped this population maintain connections with family and friends, and that there was no evidence of increased loneliness or harm as a result of Internet use.<sup>33</sup> In their review, Lai et al.<sup>31</sup> reported that the anonymous nature of Internet-based activities could, in fact, help promote health-seeking behaviour in harder-to-reach at-risk groups. Hong et al.<sup>35</sup> reported that social media was helpful in reaching rural participants (though only one study included rural populations). Two reviews mentioned that literacy levels could affect the effectiveness of the intervention.<sup>31,35</sup> Only Moorhead et al.<sup>8</sup> mentioned that the social media materials could be adapted for different literacy levels.

## Which design elements promote health equity?

Using the HEIA tool developed by the Ontario Ministry of Health and Long-term Care, we described the possible concerns for twelve populations, such as ethno-racial communities, age-related groups, sex/gender and physical disability and, where studies in the systematic reviews made reference to potential mitigation strategies, their proposed strategies.

The main concern common to several populations is the possibility of limited access to the Internet (e.g. homeless people or low-income older adults). To mitigate inequities, health promotion using social media may require providing access to the Internet and computers/mobile devices.

None of the reviews mentioned additional resources that may be needed for the behaviour changes promoted by the social media interventions, such as availability of walking paths, access to fitness facilities, affordability of co-interventions (such as nicotine patches for smoking cessation), access to affordable food and access to health care. However, these determinants and facilitators to behaviour changes should be considered in the underlying program theory and the development of any social media intervention.<sup>36</sup>

Since newer social media interventions are designed to build on individuals' existing

social networks, people with few social networks may be at a disadvantage (e.g. low-income seniors have few ties other than their grandchildren<sup>33</sup>). However, Chang et al.<sup>9</sup> showed that people with few social networks tended to use social media more, suggesting they may benefit from these interventions.

Several reviews raised the acceptability of social media interventions as a concern. Acceptability may relate to cultural acceptability and norms (such as with one study designed for a Hebrew-speaking audience<sup>31</sup>) or to population-specific preferences (e.g. one review of older adults reported unfamiliarity with Facebook<sup>33</sup>). Several reviews proposed that user testing and acceptability testing would be useful to increase the likelihood that social media interventions will be taken up by the target populations.

The reviews reported that privacy concerns and confidentiality may be an issue for certain populations such as older adults and may affect the use of social media interventions. Quality control on social media sites, such as that provided by a moderator, might help reduce privacy concerns and encourage use.<sup>8</sup>

Some populations may be particularly sensitive to hostile or misleading comments. If so, these interventions may be designed to allow a moderator to limit access to the social media group to reduce the risk of inappropriate use.

## Areas for further research

We did not find any examples of systematic reviews that focussed on using smartphone or tablet applications and social media for health promotion, possibly because smartphone applications have been only recently developed and tested. User-friendly design was described as an area for future development.

An area for further research is the use of well-known social media platforms (e.g. Facebook and Twitter) for health promotion interventions. Only 28 studies (included in 4 reviews) used well-known social media sites as the platform for the intervention;

the remainder used platforms developed by the researchers. These closed platforms did not take advantage of participants' existing social networks, but rather aimed at developing connections between people in the same health promotion/support research program so they could share experiences.

## Discussion

The reviews in this overview suggest a potential to improve health outcomes and health-promoting behaviours in the targeted populations. However, increasing health inequity was also a risk because of issues to do with access to, acceptability of and the unmonitored quality of social media.

Future research should aim to identify which social media interventions are effective and describe all aspects of the interventions, including how they are implemented and utilized, using explicit criteria such as the TIDIER (Template for Intervention Description and Replication) checklist.<sup>37</sup> Research should also explicitly document any increased negative behaviours, stigmatization or exacerbation of existing health inequities if some populations are excluded.

Interventions that use the more commonly known social media sites may experience higher use and acceptability rates because they take advantage of existing social networks. Future research should assess these platforms.

We did not find disaggregated analyses across characteristics associated with disadvantage. However, some targeted studies reported that social media interventions were effective in youth and older adults,<sup>30,33</sup> in groups with lower socioeconomic status,<sup>8</sup> in different ethnicities,<sup>31</sup> and among rural participants.<sup>35</sup> Several reviews proposed that social media could help engage harder-to-reach populations and could be designed to overcome literacy and education gaps, provided there was access to technology. However, there was very little evidence available for these populations in the primary studies or the systematic reviews. Future systematic reviews and primary studies should collect and

analyze the effect of the intervention by different population groups.

There is a need for qualitative research on the role of theory-based program design and evaluation, use of multiple components, user-centred design, and measurement of the implementation process (including use, interaction and satisfaction). When planning a social media intervention, the target population's baseline use of social media should be considered. Social media has the potential to reach harder-to-reach populations, Internet access being widely available across Canada.

## Strengths and limitations

A strength of this overview is that we took a broad approach to allow us to examine the effects of various social media interventions across a wide range of health conditions. Despite our broad inclusion criteria, we only found reviews that compared minimal intervention conditions (e.g. access to non-interactive or limited versions of study websites).<sup>30</sup> We used rapid review methods to respond to a need identified by our knowledge user. We were limited by the quality of reporting in the systematic reviews: 5 of the 11 reviews scored 5 or less out of a possible 11 on the AMSTAR tool for quality because of limitations in the search strategy, eligibility criteria and documentation of results. In other words, almost half of the systematic reviews were of low quality. Only one review reported on effect sizes with confidence intervals; others provided a narrative summary or reported only *p* values. This limited our ability to assess the size of effects and confidence in the estimates.

The systematic reviews did not consistently monitor or report use of the social media interventions. Only four reported on participant use of the intervention and all reported low use.<sup>8,9,30,34</sup> More than 20% of participants dropped out of the studies, and one review reported that less than 25% of the participants used the social media on offer as part of the studies.<sup>9</sup> As a result, we cannot determine whether the lack of effect or the mixed effects were due to lack of use by participants or lack of

effectiveness of the social media. Mixed effects may also be due to factors such as differences in populations, intervention design and implementation and/or concomitant interventions.

The HEIA tool provides a structured approach to assessing intended and unintended effects that help identify mitigation strategies. Ideally, however, this tool is used to inform the planning and development of interventions, and consultation and engagement with affected communities is essential.<sup>38</sup>

Finally, we used a rapid overview approach and therefore screening of the reviews identified by our search, data extraction and quality assessment was done by one author. We do not feel that this limitation affects the results of our overview.

## Conclusion

Based on this overview of systematic reviews, effects of social media interventions are mixed or even small. There is insufficient evidence of the design and implementation features (e.g. intensity and duration of interventions) that could lead to improved effects. More research is needed on social media that engages with existing social networks (rather than research-only platforms), acceptability and use of social media, and assessment of both desirable and undesirable effects.

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