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Systematic review of social media interventions for smoking cessation

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ABSTRACT

Background: Popular social media could extend the reach of smoking cessation efforts. In this systematic review, our objectives were: 1) to determine whether social media interventions for smoking cessation are feasible, acceptable, and potentially effective; 2) to identify approaches for recruiting subjects; and 3) to examine the specific intervention design components and strategies employed to promote user engagement and retention.
Methods: We searched Scopus, Medline, EMBASE, Cochrane Central, PsychINFO, CINAHL, and Web of Science through July 2016 and reference lists of relevant articles. Included studies described social media interventions for smoking cessation and must have reported outcomes related to feasibility, acceptability, usability, or smoking-related outcomes.
Results: We identified 7 studies (all were published since 2014) that enrolled 9755 participants (median = 136 [range 40 to 9042]). Studies mainly used Facebook ($n = 4$) or Twitter ($n = 2$), and emerged as feasible and acceptable. Five studies reported smoking-related outcomes such as greater abstinence, reduction in relapse, and an increase in quit attempts. Most studies ($n = 6$) recruited participants using online or Facebook advertisements. Tailored content, targeted reminders, and moderated discussions were used to promote participant engagement. Three studies found that active participation through posting comments or liking content may be associated with improved outcomes. Retention ranged from 35% to 84% (median = 70%) across the included studies.
Conclusions: Our review highlights the feasibility, acceptability and preliminary effectiveness of social media interventions for smoking cessation. Future research should continue to explore approaches for promoting user engagement and retention, and whether sustained engagement translates to clinically meaningful smoking cessation outcomes.

1. Introduction

Smoking is the leading preventable cause of death in the United States, accounting for about 480,000 deaths annually and over $300 billion in direct medical care and lost productivity costs (US Department of Health and Human Services, 2014). Since the 1980's the overall prevalence of cigarette smoking has declined, yet it is estimated that 40 million adults in the United States continue to smoke cigarettes (Jamal, Homa, O'Connor, et al., 2015). Several population groups also show disproportionately higher rates of tobacco use. For example, over the past 30 years there has been little change in smoking

rates among young adults despite widespread public health efforts (Abuse & Administration, 2014). Additionally, persons living below the poverty line and people with mental illness or physical disabilities are more likely to smoke cigarettes compared to the general population (US Department of Health and Human Services, 2014). It is critical to identify innovative approaches to advance population wide tobacco cessation efforts and to specifically target segments of the population at elevated risk for tobacco use.

Unprecedented growth in the use and availability of social media may afford new avenues for supporting tobacco cessation efforts. Social media encompasses interactive web and mobile platforms through

which individuals and communities can share, co-create, or exchange information, ideas, photos, or videos within a virtual network. Nearly two thirds of adults in the United States use social media (Perrin, 2015), and for most of these individuals social media has become an important fixture of their daily lives, capturing their attention at repeated time points throughout the day (Duggan, Ellison, Lampe, Lenhart, & Madden, 2015). The barriers to using social media are low given that most social media platforms are freely available and can be accessed at any time of day from any device with connection to the Internet including mobile phones, tablets, or computers. Social media use remains highest among young people and individuals with higher education, though use has steadily increased among older age groups, low-income individuals, and among people from rural areas (Perrin, 2015). Men and women use social media at comparable rates, and there are few differences in social media use between racial and ethnic groups (e.g., 56% of African Americans, 65% of Hispanics, and 65% of non-Hispanic whites use social media) (Perrin, 2015).

Social media platforms such as Facebook or Twitter have been increasingly used for health promotion and supporting public health efforts, as highlighted in a recent systematic review of 73 studies (Capurro et al., 2014). For example, this prior review found that social media appeared promising for reaching adolescents and young adults, and for targeting problem alcohol or substance use behaviors, mental health, and individuals at-risk of sexually transmitted diseases (Capurro et al., 2014). One study demonstrated the feasibility and acceptability of engaging homeless youth in an HIV-prevention program using YouTube and online communities on Facebook and MySpace (Rice, Tulbert, Cederbaum, Adhikari, & Milburn, 2012). Another study showed that Facebook could successfully support recruitment of young adult veterans with high rates of mental illness, problem drinking and substance use (Pedersen et al., 2015). Given the popularity of social media and mounting evidence supporting the use of these platforms for public health efforts and for reaching at-risk groups, there may be opportunities to reach people who have disproportionately elevated risk of smoking cigarettes and who have been difficult to engage through traditional tobacco cessation efforts.

Social media interventions could build on the success of existing web-based smoking cessation efforts. For instance, several studies support the effectiveness of web-based programs for smoking cessation (Civljak, Stead, Hartmann-Boyce, Sheikh, & Car, 2013; Shahab & McEwen, 2009), with some programs achieving quit rates that exceed 24% (Swartz, Noell, Schroeder, & Ary, 2006). Despite this success, there have been limitations in effectiveness due to substantial drop-off in participation (Shahab & McEwen, 2009), and the continued reliance on the static delivery of text-based information through self-directed learning, didactic sessions led by professionals, and few opportunities for interaction with other individuals who are also trying to quit smoking (Park & Drake, 2015). Interactive elements such as discussion boards or forums have been included as part of several web-based programs and appear promising for engaging users (Civljak et al., 2013), though these components have not been central to these interventions. In contrast, social media is highly interactive by its very nature, and may represent an avenue through which to support smoking cessation efforts by allowing users to connect with and support each other, and share their experiences or challenges in quitting smoking by posting text, photos, images, or videos (Jacobs, Cha, Villanti, & Graham, 2016).

Research shows that health behaviors can disseminate rapidly on social media, including the onset of smoking behaviors through exposure to images or depictions of tobacco use (Depue, Southwell, Betzner, & Walsh, 2015; Huang, Unger, Soto et al., 2014), as well as interest in quitting by connecting with and learning from others who share similar health goals (Struik & Baskerville, 2014; Zhang & Yang, 2013). Longitudinal data suggest that individuals who were able to successfully quit smoking had more network ties and had more direct interactions with others over social media compared to those who did

not quit (Murnane & Counts, 2014). Social interaction may be key for supporting smoking cessation on social media, yet public health campaigns on social media have largely focused on dissemination rather than engaging and interacting with users (Duke, Hansen, Kim, Curry, & Allen, 2014). The success of tobacco cessation efforts on social media will likely depend on whether the interactive features of these platforms may be effectively leveraged to engage users and members of their online networks towards encouraging and supporting the decision to quit smoking.

As social media platforms continue to evolve rapidly and use of these platforms becomes more prevalent across diverse population groups, it is critical to determine whether social media is feasible, acceptable, and potentially effective for delivering smoking cessation interventions. Identifying the features of social media interventions that appear effective and the strategies that have been successful for overcoming challenges with reaching target populations will inform the design of future smoking cessation interventions. The purpose of this systematic review is to summarize the evidence on the use of social media for smoking cessation. We address the following objectives: 1) to determine whether social media interventions for smoking cessation are feasible, acceptable, and potentially effective; 2) to identify effective strategies for recruiting subjects; and 3) to examine the specific intervention design components and strategies employed to promote user engagement and retention.

2. Methods

2.1. Search strategy

We registered our search strategy protocol to the PROSPERO International prospective register of systematic reviews (Registration number: CRD42016044080). We searched the following databases through July 31st, 2016: Scopus, Medline, EMBASE, Cochrane Central, PsychINFO, CINAHL, and Web of Science. We used search terms for social media. These terms were combined with tobacco, smoking, smoking cessation, tobacco reduction, tobacco consumption, and cigarette. Each term was entered as a key word and corresponding medical subject heading (MeSH) term. MeSH terms refer to the United States Library of Medicine's controlled vocabulary thesaurus and are primarily used for indexing articles in Medline. Combining MeSH terms with general free text search terms is important in order to identify as many relevant records as possible (Higgins & Green, 2008). No language limits were applied. The complete search strategy used in Medline is listed in Table 1. We also searched reference lists of included studies, prior systematic reviews, and Google Scholar to identify additional relevant studies.

2.2. Study selection criteria

We only included studies that recruited participants and that evaluated an intervention for smoking cessation delivered through social media. Participants could be from any population group. We

Table 1
Search strategy used in Medline.

Search	Search terms
#1	"Social media" or "social media"[Mesh]
#2	Tobacco or smoking or "smoking cessation" or "tobacco reduction" or "tobacco consumption" or "cigarette" or "tobacco use disorder"[Mesh] or "smoking cessation"[Mesh] or "tobacco use cessation"[Mesh] or "tobacco use"[Mesh] or "tobacco"[Mesh] or "tobacco products"[Mesh]
#3 (final search)	#1 and #2

Mesh indicates medical subject heading.