

Social media used as a health intervention in adolescent health: A systematic review of the literature

Julie M Shaw^{1,2}, Creina A Mitchell², Anthony J Welch¹ and Moira J Williamson¹

Abstract

Objective: Adolescents are known to be high users of social media, and social media is beginning to be used in health care. The primary objective of this review was to determine the current state of play on the use of social media as a health intervention in addressing the health of adolescents.

Methods: Six databases were searched: CINAHL, Medline, Scopus, ProQuest, Psych Info and Science Direct, from 2000–2013. The review process followed PRISMA guidelines with quality assessments of the selected articles undertaken.

Results: Three studies used social media as a health intervention in adolescent health. Facebook was the social media of choice. The way this social media tool was incorporated as the intervention varied. None of the social media interventions had a significant or sustained impact on the primary outcomes of the studies reviewed. Measures of social media process were limited and lacked meaning.

Conclusions: The selected papers provided insight into the beginning phase of using social media as a health intervention to address adolescent health. The review highlights three important areas for consideration when undertaking research on the use of social media as a health intervention for adolescents: the newness of using social media as a health intervention, the importance of the use of rigorous methodological processes when using social media as a health intervention, and the need to develop further knowledge on adolescents' use of social media, in particular their hidden world of social media.

Keywords

Social media, adolescents, health, health intervention, social media intervention, systematic review

Introduction

Over the last decade, the popular use of social media in the broader community has led to the development of opportunities for the use of social media in the health care sector. Worldwide, adolescents are noted, to varying degrees, as being social media savvy,^{1,2} the degree of savviness being dependent on governmental policy, individual socioeconomic and geographical limitations as well as societal norms.³ So much so, that market research on adolescents outpaced research by academics in the year 2000.⁴ Whilst 'social media' is a relatively new concept in the health literature, there are numerous opinions and commentary papers that promote the dangers of social media^{5,6} and the use of social media in health care,^{7,8} particularly in the area of adolescent health.

Adolescence is an acknowledged phase of individual growth and development,² yet the term 'adolescent' is used inconsistently to refer to young people from a variety of age groups. For the purpose of this paper 'adolescence' refers to young people aged 12–24 years and incorporates the early, middle and late stages of adolescence that are individual experiences.⁹ These individual experiences are affected by the individual's circumstances; that is, socioeconomic status, support

¹School of Nursing and Midwifery, Central Queensland University, Australia

²School of Nursing and Midwifery, Menzies Health Institute Queensland, Griffith University, Australia

Corresponding author:

Julie M Shaw, School of Nursing and Midwifery, Gold Coast campus, Griffith University, Queensland, 4222, Australia.

Email: j.shaw@griffith.edu.au



network/s and the wider societal environment,⁹ including the use of social media. Social media provides young people with individual networks that can be used to promote and reflect the young person's individualism and community. Social media makes up a significant portion of the young person's life as it is central to their lifeworld, encompassing communication, work, study and leisure,¹⁰ and as such provides one possible avenue to affect adolescent participation and empowerment in the management of their health.

Social media is not a static entity. It is an evolving concept, one that changes with the development and use of technology. A simple dictionary definition describes social media as "online social networks used to disseminate information through online social interaction."¹¹ Essentially this means that users talk, share information, provide feedback and network on these sites,¹² hence the term 'social.' The definition excludes technology such as texting and email not associated with sites. Examples of social networks include Facebook, MySpace, blogs, Tumblr, Reddit, Wikis, YouTube, Twitter and Instagram, with adolescents recognized as skilled users of these sites. Kaplan and Haenlein¹³ provide a greater understanding of social media by identifying characteristics of various social media categories as follows: (1) Collaborative projects, whereby users generate the content; (2) Blogs, where contributions are date stamped; (3) Content communities, where media is shared between users, for example YouTube; (4) Social networking sites, where users connect on a personal level, for example Facebook; (5) Virtual game worlds—three-dimensional platforms (worlds) where users create avatars to interact with others obeying strict world rules; and (6) Virtual social worlds—three-dimensional platforms where users create avatars to interact with others freely. These categories require different knowledge and skills of users for successful participation in the various networks as well as providing different opportunities for use in health care. For example, blogs require the user to simply be able to ask questions and respond truthfully to questions, whereas game worlds provide opportunities for health promotion via gaming.¹⁴

Access to web-based applications and platforms can be limited via membership or 'friendship' as seen on Facebook, to maintain degrees of user privacy and/or secrecy,¹⁵ an important aspect when considering use in health care. More change in social media is expected with the increasing use of mobile social media, such as Smart phones and tablets, as users manipulate and further extend the use of these communication tools. Mobile social media is recognized as facilitating timely and more efficient communication¹³ and is routinely used in the business operations of health practices and clinics, for example texting appointment

reminders.¹⁵ As 'digital natives,'¹⁶ adolescents are known as high users of social media,^{17,18} thus providing a variety of means to access and communicate with adolescents about health.

The health literature to date has focused on the negative aspects of social media related to the volume and value of information available for adolescents;¹⁹ the perceived superficial screening of selected information and the possible acceptance of this information that may, of course, be invalid; concerns over the impact of social media on the physical and psychological health of young people, including a sedentary life style, loss of sleep and associated cognitive impairment; and consequences of negative self-perception, bullying, social isolation and reduced social cohesion.¹⁰ More recently this research has focused on the use of social media with adolescent health. To date, review articles inclusive of adolescents and social media have reported on: the effectiveness of social networking sites for all phases of research;²⁰ the use of digital media to improve adolescent sexual health;²¹ and the potential outcomes of adolescent social internet use.²² All review articles identified the potential of social media for use in adolescent health research.

This paper reviews the current literature on the use of social media in adolescent health to address the question: How has social media been used as a health intervention to address the health of adolescents? The objectives of this review were to (1) identify published accounts of health professionals using social media as a health intervention to address the health of adolescents; (2) conduct a quality appraisal of the selected studies; and (3) identify prospective areas of research to improve the use of social media as a health intervention in adolescent health.

Method

Search strategy

The study was conducted systematically and documented to provide transparent reporting of the review process, demonstrating best practice.^{23,24} Social media being a relatively new term, the search strategy was limited to literature from January 2000 through to December 2013. Six databases were searched, including CINAHL, Medline, Scopus, ProQuest, Psych Info and Science Direct. Prior to the searching of all databases, search terms were initially tested to determine effectiveness in delivering research articles that met the inclusion criteria. The search terms used were adolescent,* and social media. The search was conducted consecutively using the identified databases and search terms. Duplicates of papers were removed. Reference lists from the selected papers were also reviewed for

potentially relevant articles, with five additional papers meeting the criteria after review.

Following the electronic literature search, the titles and abstracts of the resulting 1010 papers were reviewed by two authors independently (JS and CM) to assess suitability for inclusion. Inclusion criteria for this review were: original research studies that reported on social media use as a health intervention and the resultant adolescent health outcomes; published in peer-reviewed journals; studies published using the English language; studies with the focus on participants in the 12–24 years age group. Literature that was opinion based or anecdotal was excluded from the review. Studies were excluded that reported on the prevalence of adolescent social media use;^{25–27} the use of email and texting in adolescent health care;^{15,28,29} the effectiveness of social media for recruitment of²⁰ and access to adolescents;^{30,31} conference proceedings;^{4,32} the positive impact of social media use on adolescents;³³ and those that described the negative impacts of social media use on adolescents.^{34–37}

Of the original 1010 papers, 104 papers were read and assessed by two reviewers (JS and CM) to further determine suitability for inclusion in the review. Differences of opinion were resolved via discussion and consensus. On completion of this assessment three papers were available for further appraisal. No further attempt to limit the number of studies on quality grounds was undertaken, given the small number of papers. The limited number of papers for review is explained by the exclusion of papers as follows: 16 papers were excluded as they were not research based; 17 papers were excluded as participant age was outside the age limit of the review; 28 papers were excluded as social media, earlier defined,¹⁵ was not part of the individual studies, that is, technology such as email or texting may have been used; and 40 papers that included social media were excluded as the health intervention did not involve the use of social media; that is, social media may have been used for identification of risky behavior,³⁸ recruitment,²⁰ or follow-up but not for the actual health intervention in the study.

Appraisal of selected literature

Appraisal of the selected literature was undertaken by two of the authors (JS and CM) using the QualSyst scoring system, developed by the Alberta Heritage Foundation for Medical Research³⁹ to evaluate primary research papers. QualSyst was deemed appropriate for this review as it provided a process for the appraisal of a variety of quantitative research methodologies³⁹ as found in the selected studies. The use of QualSyst assisted in detecting risk of bias within the studies. The papers for review were considered on

methodological quality and the quality of social media information provided, which in turn minimized reviewer bias.

Results

The number of papers generated using the term ‘social media’ increased yearly from 14 papers in 2001 to 222 papers in 2013 (see Table 1), highlighting the increasing acceptance of the term and indicating the uptake of social media in adolescent health research. An overview of the literature selection is provided by Figure 1. The three studies selected for review were one cluster-randomized trial,⁴⁰ one randomized trial (RCT)⁴¹ and one mixed-method study⁴² that involved a quantitative cross-sectional survey plus pre- and post- intervention evaluation. The two randomized trials contained two arms: intervention and comparison. All studies were conducted in the United States. Data were collected between 2010 and 2011 and all study results were published in 2012. Table 2 provides a summary of the papers, identifying study characteristics of individual

Table 1. Social media publications per year.

Year of publication	Number of publications
2000	21
2001	14
2002	19
2003	22
2004	24
2005	48
2006	51
2007	55
2008	66
2009	69
2010	90
2011	123
2012	179
2013	222
2014	7
Total	1010

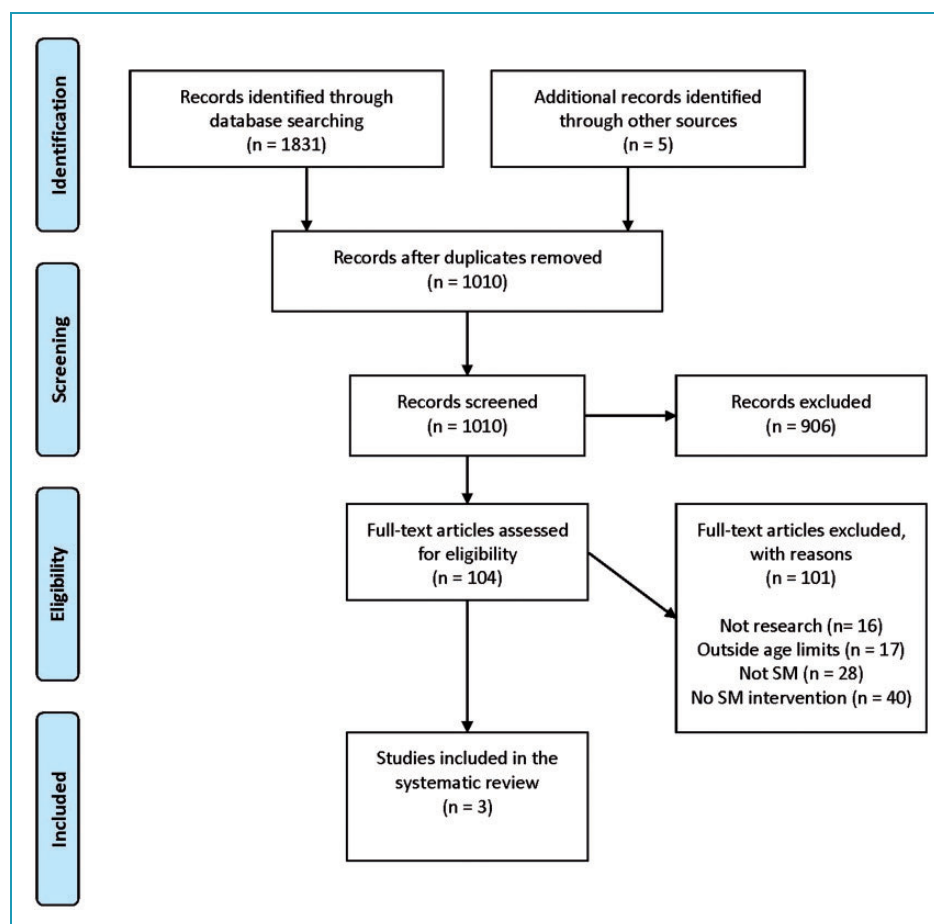


Figure 1. PRISMA flow chart showing literature selection.

review papers, focusing on methodological quality and social media interventions and measures.

Methodological quality

All studies had a risk of bias as a result of their allocation methods, lack of blinding, self-reporting and incomplete outcome data, subsequently affecting the validity of results. The randomized trials did not clearly describe how the randomization sequence was generated, nor did they describe how individuals were allocated at the point of randomization. For example, Bull et al.⁴⁰ had an imbalance between groups at the start of the study; 942 in the intervention arm and 636 in the control arm. Both arms used respondent-driven sampling, so it is unclear why the imbalance occurred. Incomplete outcome data resulted from attrition in the two RCTs and inadequate sampling in the mixed-method study. Bull et al.⁴⁰ had differential attrition; 45% of the intervention group and 59% of the comparison group completed the 6-month data collection, representing over 55% of participants lost to follow-up. Cavallo et al.⁴¹ had 84% of the intervention group and

96% of the comparison group complete the 8-week data collection; only 16% were lost to follow-up. Jones et al.⁴² used a convenience sample of 70, which did not reach the researchers' calculated sample size of 105 participants.

The use of incentives may also have contributed to bias. Two studies offered incentives. Bull et al.⁴⁰ used respondent-driven sampling and provided participants with \$US5 gift cards for every person they referred who participated, to a maximum value of \$US15. Participants were also eligible for a \$US15 gift card for completing the baseline and 6-month follow-up, a maximum value of \$US30 for data collection. Cavallo et al.⁴¹ provided \$US30 to participants who completed baseline and 8-week data collection.

Primary outcomes in all studies were self-reported, so lack of blinding may be a source of bias. Self-reporting also indicates that the survey responses may not truly reflect reality, as participants may have aimed to provide the responses that reflected how they believed they 'should have behaved' and not how they did behave. Table 2 shows that social media interventions did not appear to affect the primary outcomes of

Table 2. Characteristics of included studies.

Author (Year) Country	Aim/s (length of intervention)	Study design	target population	Social media intervention Social media activities	Primary outcome measure (tool) Secondary outcome measure (social media)	Primary results Secondary results
Randomized trials						
Bull et al. (2012) USA	To determine whether prevention messages including sexual health information, delivered via Facebook, are effective in preventing risky sexual health behavior (8-week intervention repeated twice; 6 months total intervention)	Cluster-randomized controlled trial	16–24-year-olds with Facebook account	Sexual health education delivered via study Facebook site <i>Intervention Facebook site “Just/Us” used to:</i> <ul style="list-style-type: none"> • Host intervention content; one topic per week • e.g. information, quizzes, links to videos, discussions • Broadcast a rich site summary (RSS) feed to intervention participants’ Facebook accounts • Prompt intervention group participants to complete data collection <i>Control Facebook site “18–24 News” used to:</i> <ul style="list-style-type: none"> • Display news, excluding sexual health content • Prompt control group participants to complete data collection 	<p><i>Primary outcome measures:</i> Self-complete online surveys at 2 and 6 months</p> <p><i>Secondary outcome measures:</i> (a) Number of unique visits/week Facebook site “Just/Us” (b) Time on Facebook (minutes) (c) Intervention participants who posted on site (d) Number of posts during study period</p>	<p><i>Primary results:</i> Difference in condom use at 2 months ($F=5.37$, $p=0.02$) No difference in primary outcomes at 6 months</p> <p><i>Secondary results:</i> (a) Average 43, range 37–101 (b) Average 3.16 min, range <1–7.3 min (c) $N=93$ (10%) [termed ‘loyal visitors’] (d) $N=277$</p>
Cavallo et al. (2012) USA	To determine whether a physical activity intervention that combined physical activity monitoring, education and online social networking, delivered via Facebook, is effective in increasing social support for physical activity compared with an education-only control (12-week intervention)	Randomized controlled trial	Female college students <25 years with a Facebook account, <30 min daily physical activity, >30 min use of Facebook daily	Physical activity education and monitoring and social support delivered via study Facebook site <i>INSHAPE website used to:</i> <ul style="list-style-type: none"> • Provide educational information on physical activity • Provide study emails • Moderate discussion <i>Additional site support provided for Intervention participants to:</i> <ul style="list-style-type: none"> • Access self-monitoring tools to set goals, track physical activity, view progress chart • Opt to join Facebook for social support exchange • Access Facebook messaging 	<p><i>Primary outcome measures:</i> Self-complete online survey at baseline, 10 and 12 weeks</p> <p><i>Secondary outcome measures:</i> (a) Total number of log-ins to INSHAPE website (b) Percentage of participants self-reporting use of Facebook per month (c) Percentage of participants posting on group wall (d) Percentage of participants interacting on discussion board</p>	<p><i>Primary results:</i> No significant differences between groups for primary outcomes at 10 and 12 weeks</p> <p><i>Secondary results:</i> (a) $N=584$ (b) 63% of intervention participants reported visiting Facebook at least 2–3 times per month (c) 50% (d) 32%</p>
Non-randomized studies						
Jones et al. (2012) USA	1. To what extent does STD prevention education transmitted	Mixed methods: (a) Quantitative cross-sectional		Sexual health education via community health STD Facebook site	<p><i>Primary outcome measures:</i> (a) Self-complete online survey of</p>	<p><i>Primary results:</i> (a) Prior to intervention: 57%</p>

(continued)

Table 2. Continued

Author (Year) Country	Aim/s (length of intervention)	Study design target population	Social media intervention Social media activities	Primary outcome measure (tool) Secondary outcome measure (social media)	Primary results Secondary results
	via a social media site (Facebook) decrease the intention to engage in risky sexual behavior? 2. To what extent does STD prevention education transmitted via a social media site (Facebook) decrease the incidence of reported Chlamydia cases? (22-month intervention)	survey plus (b) Pre- and Post- evaluation (a) 15–24-year-olds who accessed the study site (b) 15–24-year-olds tested for Chlamydia, and residing in the local health district	Community health STD Facebook site used to: 1. Recruit visitors to site who agreed to complete study survey were recruited 2. Provide access to education materials and links to further information 3. Prompt visitors and friends to participate in survey	sexual behavior opened 17 months after study site available to the public and was open for 5 months (b) Review of available county STD data before and after Community health STD Facebook site opened (2008: 2010) Secondary outcome measures: (a) Number of visitors to site who chose to 'Like' Facebook (friends) over the 22 months of study	condom use (b) Post intervention: 80% intention to use condom (c) Positive cases of those 15–24-year-olds tested positive for Chlamydia at local health district 2008: 132/828 (16%) 2010: 139/767 (18%) Secondary results: (a) N=896

the selected studies. The RCTs reported no significant difference in primary outcomes between the intervention and control groups.^{40,41} The mixed-method study was low quality and did not assess actual behavior change, only intention to use condoms. The study did not decrease the incidence of reported Chlamydia cases.⁴² Secondary outcomes were obtained from self-reporting,^{40,41} use of the Facebook Intensity Scale⁴¹ and use of the Facebook study site activity statistics.^{40–42} Self-reporting and the use of Facebook site activity statistics do not provide objective measures and may be a source of bias. The secondary measures used in the three studies and associated results are reported in the following section.

Social media interventions, measures and results

Facebook was the commercial product used in all three studies, and having a Facebook account was an inclusion criterion for all three studies. The way this social media tool was incorporated as the intervention varied, as identified in Table 2. Bull et al.⁴⁰ created a Facebook site that hosted content such as quizzes, video links, discussions and games to foster learning on sexual health topics. Participants were allocated different site pages dependent on assignment to groups, control or intervention. All intervention participants had to 'like' a Facebook page as part of the eligibility criteria. A rich site summary (RSS) feed was broadcast or pushed to the member's Facebook page weekly. Cavallo et al.⁴¹ had an internet site that provided educational information promoting physical activity. Intervention participants were provided with access to self-monitoring tools and invited to join a Facebook site where they could exchange social support, with 96% of intervention participants taking up the invitation. Jones et al.⁴² created a Facebook site that promoted sexual health and was linked to other local adolescent websites. A convenience sample of those who accessed the site was surveyed regardless of whether they were 'friends' of the site.

The three studies used a variety of available social media statistics to measure social media interaction, including number of log-ins to the Facebook study sites; number of visits to the Facebook study site; number of Facebook study site 'likes'; self-reporting of the number of Facebook site visits; length of visit to Facebook study site (minutes); number of posts on Facebook study site wall; and number of responses to posts. A Facebook Intensity Scale that measures study Facebook site usage, emotional connectedness to the Facebook study site and integration of the Facebook study site into participants' daily activities⁴³ was used by Cavallo et al.⁴¹ The results varied, and attrition was noted over the time of the two RCTs and implied in the

mixed-method study's inability to meet the calculated sample size. Bull et al.⁴⁰ identified that 6.8% of the control group 'Liked' the study Facebook compared with 100% of the intervention group. Liking the study Facebook site was a condition of eligibility for the intervention. Of those enrolled in the intervention group, 10% posted regularly and were identified as 'loyal visitors'. In total there were 277 posts during the study period and 1578 participants. Cavallo et al.⁴¹ reported that the total log-ins to the INSHAPE website was 548 over the duration of the study. The Facebook Intensity Scale, used to track participant Facebook activities/interaction, indicated that the control group had higher scores than the intervention group. Participant Facebook activity declined over the duration of the study. Jones et al.⁴² did not report on the number of views or individuals that viewed the Facebook site. They did report that 896 youth 'friended' the site between the time the site opened and the research commenced—a period of 17 months.

Discussion

The aim of this review was to provide an up-to-date perspective of how social media has been used as a health intervention to address the health of adolescents. The common social media intervention provided by the three studies reviewed was education. Whilst there are a number of different social media types, all studies reviewed used Facebook study sites, with one also using a study website, as the interventions. There were no significant sustained results in any of the three studies. Participant engagement throughout all studies declined over the period of the study. This review focuses on the newness of using social media as a health intervention; the importance of the use of rigorous methodological processes and clarity in reporting these processes; and the limited knowledge of how adolescents use social media.

The review emphasizes that the use of social media as a health intervention is novel. Whilst the search for the review literature identified the acceptance and increased use of the term 'social media,' the selection of literature reflected the logical development of use in health care of this new phenomenon. The development of social media use in adolescent health care is shown in both the excluded and included papers. Excluded papers included papers that described social media and explained how social media works; studies that reported on the prevalence of adolescent social media use; opinion papers that identified the potential dangers of adolescent social media use; studies that investigated the potential dangers and benefits of adolescent social media use; studies that investigated use of digital technologies, email and texts, in health research and health

care; opinion papers that identified the potential for use of social media in health care; the use of social media to identify young people at risk; the use of digital technologies including social media to facilitate research by providing avenues for advertising research, access to adolescents and prompting study participation; and review papers. Included papers came from the later years of the review and were studies that used social media as a health intervention to improve the health of adolescents. Not only does this review show the development of social media in health care but also the breadth of the exploration of social media in the health sector.

The studies reviewed provide insight into the use of social media as an intervention for improving adolescent health, and indicate that there is much to be learnt about social media and its use in health care. There are a number of methodological issues that need to be considered when working with social media and adolescents. If social media is to be considered as an intervention, it is vital the intervention interactions can be reported. For example, in the reviewed studies, the intervention dose was difficult to fathom as participant interactions with social media were not always measured in a rigorous and reliable manner. Attempts were made to identify participant interaction, such as 'Liking' the site, but in reality this was part of the engagement process for participants.⁴⁰ Although Cavallo et al.⁴¹ used the Facebook Intensity Scale⁴³ to measure social support, the overall measure was not provided; instead, information on sections of the scale, such as participant completion of the post-study survey and the number of times participants reported accessing Facebook, was provided. This would indicate that the measuring of participant interaction with social media interventions needs further development, and that the reporting of this activity needs to be transparent and clear. The issue of contamination is raised around concerns of whether participants in the control arm of an RCT are able to gain exposure to the social media intervention. Contamination is important from the perspective of the lifeworld of adolescents and their networked communities, raising the questions: (1) Will adolescent participants in social media studies provide access to interventions for friends? (2) Will social media skilled adolescents in control groups be able to access protected study interventions? Lastly, the issue of maintaining participant engagement throughout the research is important in developing methodologically rigorous studies which produce reliable results. Engagement may relate to developing further knowledge on adolescent use of social media.

Adolescent use of social media is dynamic. The appropriate social media to access adolescents is unknown although the assumption, borne out by the

studies in the review, is that Facebook provides the most effective access to adolescents. This may or may not be so. Currently adolescents remain high users of Facebook, but are beginning to move on to newer media such as Twitter and Instagram.⁴⁴ Interestingly, the reviewed studies did not show significant results from the use of Facebook interventions. Adolescents, as digital natives,¹⁶ are proficient in the use of social media. Indeed, adolescents are often the social media teachers or interpreters for the adults,⁴⁵ similar to immigrant children who become the interpreters of the 'new language' for their parents.⁴⁶ As such, adolescents may logically be able to manage the access and use of social media by adults, manipulating the reality of the 'hidden world' and the truth of interacting in that world. Conceptually, the adolescent hidden world of social media remains unknown, and this has relevance for researchers as adults, parents or researchers may have their access to these areas restricted by adolescents. Adolescents have a tendency to progress on to newer media when available and/or when their associated adults (parents) catch up. For example, adolescents initially used MySpace to communicate with friends in their networked communities.⁴⁷ Adolescents moved on to new technology, such as Facebook, when the new technologies were available, their networked communities moved, or to maintain their private space.⁴⁷ Alternatively, privacy could also be maintained by adolescents creating a new MySpace site which parents were not aware of and did not have access.⁴⁷ These examples support the notion of a 'hidden world' or 'secret world', and raise the issue for future researchers of truth and reality in interaction with adolescents on social media. In other words, adolescents skilled in social media can control their hidden world and researchers can only research, observe and interact in the parts of that world to which young people allow them access.

The strengths of this review are the systematic evaluation of peer-reviewed studies with a focus on an emerging area of research. Some limitations of the review are noted. The review adopted a definition of social media which can be problematic when reviewing a developing phenomenon and may have led to exclusion of studies identified in prior reviews. The search terms used may have meant that those studies that used terms other than 'social media', such as 'digital technologies' or 'communication technology', were omitted from the review. The small number of studies selected affects the power of the findings and recommendations.

The current review systematically searched the peer-reviewed health literature to identify published accounts of health professionals using social media as a health intervention to address the health of adolescents. An appraisal of the selected studies was carried

out. The review highlights three important areas for consideration when undertaking research on the use of social media as an adolescent health intervention: the newness of using social media as a health intervention; the importance of the use of rigorous methodological processes when using social media as a health intervention; and the need to develop further knowledge on adolescents' use of social media, in particular their hidden world of social media.

Funding: This research received no grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declaration of conflicting interest: None declared.

Ethical approval: Not applicable.

Guarantor: JS

Author contributions: JS and CM identified the need for the study as well as searched and evaluated the literature. JS and CM developed Tables 1 and 2, Figure 1. JS wrote the first draft of the manuscript. CM contributed to the first draft. AW and MW advised on the content and structure of the manuscript. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

Peer-review: The reviewers of this manuscript have chosen to remain anonymous.

References

1. Hur JL and Gupta M. Growing up in the web of social networking: Adolescent development and social media. *Adolesc Psychiatry* 2013; 3: 233–244.
2. Sawyer SM, Afifi RA, Bearinger LH, et al. Adolescence: A foundation for future health. *Lancet* 2012; 379: 1630–1640.
3. Ishii K and Wu C-I. A comparative study of media cultures among Taiwanese and Japanese youth. *Telemat Inform* 2006; 23: 95–116.
4. Montgomery K. Youth and digital media: A policy research agenda. *J Adolesc Health* 2000; 27S: 61–68.
5. Bower P. Growing up in an online world: The impact of the internet on children and young people. *Community Pract* 2013; 86: 38–40.
6. Strasburger VC. Children, adolescents and the media: What we know, what we don't know and what we need to find out (quickly!). *Arch Dis Child* 2009; 94: 655–657.
7. Boyce N. The Lancet technology: April, 2012. *Lancet* 2012; 379: 1580.
8. Weaver B, Lindsay B and Gitelman B. Communication technology and social media: Opportunities and implications for healthcare systems. *Online J Issues Nurs* 2012; 17: 1–16.
9. Australian Institute of Health and Welfare. Young Australians: Their health and wellbeing, 2011. 2011; AIHW cat. no. PHE 140. Available from: <http://www.aihw.gov.au/publication-detail/?id=10737419261> (accessed 30 September 2014).
10. Eckersley R. A new narrative of young people's health and well-being. *J Youth Stud* 2011; 14: 627–638.

11. Macquarie dictionary online. 6th ed. Macquarie Dictionary Publishers, an imprint of Pan Macmillan Australia Pty Ltd, 2003. Available from <https://www.macquariedictionary.com.au/> (accessed 15 August 2010).
12. Niemer E. Teenagers and social media. *Alive: Canada's Natural Health & Wellness Magazine*. 2012: 20–29. Alive Publishing Group Inc (APG).
13. Kaplan AM and Haenlein M. Users of the world, unite: The challenges and opportunities of social media. *Bus Horiz* 2010; 53: 59–68.
14. Size Five Games. Privates. Size Five Games previously known as Zombie Cow Studios, 2010 May (updated 1 February 2015). Available from: <http://www.sizefivegames.com/games/privates/> (accessed 15 March 2015).
15. Woolford SJ, Blake N and Clark SJ. Texting, tweeting and talking: E-communicating with adolescents in primary care. *Contemp Pediatr* 2013; 30: 12–18.
16. Prensky M. Digital natives, digital immigrants. *On the Horizon* 2001; 9: 1–6.
17. Australian Communications and Media Authority. Like, post, share: Young Australians' experience of social media (Quantitative Report). Canberra (AU): Australian Communications and Media Authority; September 2013. Available from: <http://acma.gov.au/theACMA/Library/researchacma/Research-reports/young-australians-and-social-media> (accessed 15 March 2015).
18. Lenhart A, Purcell K, Smith A, et al. Social media & mobile internet use among teens and young adults. Washington (USA): Pew Internet & American Life Project; 3 February 2010. Available from: <http://pewinternet.org/Reports/2010/Social-Media-and-Young-Adults.aspx> (accessed 15 March 2015).
19. Morimoto SA and Friedland LA. The lifeworld of youth in the information society. *Youth Soc* 2011; 43: 549–567.
20. Park BK and Calamaro C. A systematic review of social networking sites: Innovative platforms for health research targeting adolescents and young adults. *J Nurs Scholarsh* 2013; 45: 256–264.
21. Guse K, Levine D, Martins S, et al. Interventions using new digital media to improve adolescent sexual health: A systematic review. *J Adolesc Health* 2012; 51: 535–543.
22. Pujazon-Zazik M and Park M. To tweet, or not to tweet: Gender differences and potential positive and negative health outcomes of adolescents' social internet use. *Am J Mens Health* 2010; 4: 77–85.
23. Kable AK, Pich J and Maslin-Prothero SE. A structured approach to documenting a search strategy for publication: A 12 step guideline for authors. *Nurs Educ Today* 2012; 32: 878–886.
24. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med* 2009; 6: e1000097.
25. Gross EF. Adolescent internet use: What we expect, what teens report. *J Appl Dev Psychol* 2004; 25: 633–649.
26. Aslanidou S and Menexes G. Youth and the internet: Uses and practices in the home. *Comput Educ* 2008; 51: 1375–1391.
27. Subrahmanyam K, Reich SM, Waechter N, et al. Online and offline social networks: Use of social networking sites by emerging adults. *J Appl Dev Psychol* 2008; 29: 420–433.
28. Gold J, Lim MS, Hellard ME, et al. What's in a message? Delivering sexual health promotion to young people in Australia via text messaging. *BMC Public Health* 10: 792.
29. Nickels A and Dimov V. Innovations in technology: Social media and mobile technology in the care of adolescents with asthma. *Curr Allergy Asthma Rep* 2012; 12: 607–612.
30. Ezell JM, Saltzgaber J, Peterson E, et al. Reconnecting with urban youth enrolled in a randomized controlled trial and overdue for a 12-month follow-up survey. *Clin Trials* 2013; 10: 775–782.
31. Masson H, Balfe M, Hackett S, et al. Lost without a trace? Social networking and social research with a hard-to-reach population. *Br J Soc Work* 2013; 43: 24–40.
32. Biocca F. New media technology and youth: Trends in the evolution of new media. *J Adolesc Health* 2000; 27(Suppl 1): 22–29.
33. Van Zalk MH, Branje SJ, Denissen J, et al. Who benefits from chatting, and why? The roles of extraversion and supportiveness in online chatting and emotional adjustment. *Pers Soc Psychol Bull* 2011; 37: 1202–1215.
34. Jelenchick LA, Eickhoff JC and Moreno MA. "Facebook depression?" social networking site use and depression in older adolescents. *J Adolesc Health* 2013; 52: 128–130.
35. Landry M, Gonzales FA, Wood S, et al. New media use and sexual behavior among Latino adolescents. *Am J Health Behav* 2013; 37: 422–430.
36. Huang GC, Unger JB, Soto D, et al. Peer influences: The impact of online and offline friendship networks on adolescent smoking and alcohol use. *J Adolesc Health* 2014; 54: 508–514.
37. Wolniczak I, Caceres-DelAguila JA, Palma-Ardiles G, et al. Association between facebook dependence and poor sleep quality: A study in a sample of undergraduate students in Peru. *PLoS One* 2013; 8: e59087.
38. Moreno MA, Vanderstoep A, Parks MR, et al. Reducing at-risk adolescents' display of risk behavior on a social networking web site: A randomized controlled pilot intervention trial. *Arch Pediatr Adolesc Med* 2009; 163: 35–41.
39. Kmet LM, Lee RC and Cook LS. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. Edmonton: Alberta Heritage Foundation for Medical Research (AHFMR). HTA Initiative #13; 2004. Available from: <http://www.ihc.ca/documents/HTA-FR14.pdf>
40. Bull SS, Levine DK, Black SR, et al. Social media-delivered sexual health intervention: A cluster randomized controlled trial. *Am J Prev Med* 2012; 43: 467–474.
41. Cavallo DN, Tate DF, Ries AV, et al. A social media-based physical activity intervention. *Am J Prev Med* 2012; 43: 527.
42. Jones K, Baldwin KA and Lewis PR. The potential influence of a social media intervention on risky sexual behavior and chlamydia incidence. *J Community Health Nurs* 2012; 29: 106–120.
43. Madden M, Lenhart A, Cortesi S, et al. Teens, social media and privacy. Pew Research Center, 2013. Available from: <http://pewinternet.org/Reports/2013/>

- Teens-Social-Media-And-Privacy.aspx (accessed 15 March 2015).
44. Ellison NB, Steinfield C and Lampe C. The benefits of Facebook “friends:” Social capital and college students’ use of online social network sites. *J Comput Mediat Commun* 2007; 12: 1143–1168.
 45. Correa T. Bottom-up technology transmission within families: Exploring how youths influence their parents’ digital media use with dyadic data. *J Commun* 2014; 64: 103–124.
 46. Fleck JR and Fleck DT. The immigrant family: Parent-child dilemmas and therapy considerations. *Am Int J Contemp Res* 2013; 3: 13–17.
 47. Boyd D. Why youth (Heart) social network sites: The role of networked publics in teenage social life. In David Buckingham (ed) *MacArthur Foundation Series on digital learning – youth, identity, and digital media volume*. Cambridge, MA: MIT Press, 2007. Available at: <http://www.danah.org/papers/WhyYouthHeart.pdf> (accessed 20 March 2015).
-