**Social media in undergraduate medical education: A systematic review**

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**Abstract**

**Introduction**

There are over 3.81 billion worldwide active social media (SoMe) users. SoMe is ubiquitous in medical education, with roles across undergraduate programmes, including professionalism, blended learning, well-being and mentoring. Previous systematic reviews took place before recent explosions in SoMe popularity and revealed a paucity of high-quality empirical studies assessing its effectiveness in medical education. This review aimed to synthesise evidence regarding SoMe interventions in undergraduate medical education, to identify features associated with positive and negative outcomes.

**Methods**

Authors searched 31 key terms through seven databases, in addition to references, citation and hand searching, between 16th June and 16th July 2020. Studies describing SoMe interventions and research on exposure to existing SoMe were included. Title, abstract and full paper screening were undertaken independently by two reviewers. Included papers were assessed for methodological quality using the Medical Education Research Study Quality Instrument (MERSQI) and/or the Standards for Reporting Qualitative Research (SRQR) instrument. Extracted data were synthesised using narrative synthesis.

**Results**

112 studies from 26 countries met inclusion criteria. Methodological quality of included studies had not significantly improved since 2013. Engagement and satisfaction with SoMe platforms in medical education are described. Students felt SoMe flattened hierarchies and improved communication with educators. SoMe use was associated with improvement in objective knowledge assessment scores and self-reported clinical and professional performance, however evidence for long term knowledge retention was limited. SoMe use was occasionally linked to adverse impacts upon mental and physical health. Professionalism was heavily investigated and considered important, though generally negative correlations between SoMe use and medical professionalism may exist.

**Conclusions**

Social media is enjoyable for students, may improve short term knowledge retention and can aid communication between learners and educators. However, higher-quality study is required to identify longer-term impact upon knowledge and skills, provide clarification on professionalism standards and protect against harms.

**Introduction**

The explosion of Social Media (SoMe) has infiltrated all aspects of modern society. The scale of the phenomenon can be daunting to conceptualise. There are over 3.81 billion worldwide active users1, while individuals have an average of seven accounts each2. Facebook, the most popular platform, boasts over a billion more users than the population of China, the world’s most populous country1,3.

It is perhaps inevitable that this technology would become ubiquitous within medical education delivery. Our field craves innovation and strives to adapt its future workforce to changing environments4,5. There are few arenas as chaotic as SoMe: since its conception, hundreds of platforms have risen in prominence before falling into obscurity6. Various platforms have been utilised within undergraduate medical education curricula, with roles in professionalism7, blended learning8, student well-being9 and mentoring10 representing a fraction of their application.

The argument for integration of SoMe into educational practice is supported by multiple theoretical standpoints, including development of rapid, accessible communities of practice11 , based upon constructivist principles, generated during classes12, conferences13 or conversations14. Moreover, connectivism is a ‘new’ educational theory, mirroring constructivism, born out of such technology enhanced learning15.

Research to date examining the impact of SoMe use on medical students’ academic attainment has found no relationship between daily usage, platform preferences and performance on summative assessments16. The majority of medical students have SoMe accounts. The result is a powerful tool that can reach virtually every student on platforms already integrated in their daily lives.

As educators, it is no longer a question of whether SoMe has educational applications, or whether undergraduate populations are actively using these platforms for their learning. Rather, we should be asking how best to utilise SoMe, and whether such platforms can facilitate specific outcomes.

Previous systematic reviews of SoMe in medical education have investigated outcomes and efficacy17–19. However, these took place before the SoMe ‘boom’ of recent years, revealing a paucity of high-quality empirical studies assessing effectiveness of SoMe in medical education. An updated review, synthesising contemporary SoMe scholarship, is required for the current landscape.

In the advent of the COVID-19 pandemic, a once-in-a-century event, the medical education community has transformed20. There have been calls for a new paradigm of educational delivery through technology enhanced learning21, with SoMe at the forefront of this revolution22. It is imperative that, before committing to placing SoMe as a foundation of any new approach, we critically examine the evidence for its efficacy.

This review aims to synthesise the evidence regarding SoMe interventions in undergraduate medical education, in order to identify features associated with positive and negative outcomes.

**Methods**

This is a systematic review reported in accordance with the STructured apprOach to the Reporting In healthcare education of Evidence Synthesis (STORIES) statement23.

**Search strategy**

We performed an electronic search of 31 terms and their Boolean combinations (illustrative full terms for one database are provided in appendix 1) through seven databases: Medline, Cumulative Index of Nursing and Allied Health Literature (CINAHL), British Education Index (BEI), Education Resources Information Center (ERIC), Embase, PsycINFO, Applied Social Sciences Index and Abstracts (ASSIA), and the Australian Education Index. Search terms were derived through reviewing keywords of papers identified though a pilot search, and a list of social media platforms. No limits were imposed. Searches were performed between 16th June and 16th July 2020 by one reviewer (ER).

We scrutinised reference sections and performed forwards citation tracking of all included papers using PubMed’s ‘cited in’ feature, and previous pertinent reviews in order to identify further relevant papers. One reviewer (JG) hand searched the full contents of one journal (MedEdPublish) that was considered relevant but not indexed in the above electronic databases. This journal was chosen as studies identified in the reference section of identified papers were published here, and we were aware that it was not indexed in any of the databases we had searched.

All citations were downloaded and imported into web-based systematic review software (DistillerSR, Evidence Partners, Ottawa, Canada) in order to facilitate screening and data extraction.

**Inclusion and exclusion criteria**

For inclusion, articles had to provide primary data on the use of SoMe amongst undergraduate medical students. Studies describing SoMe interventions and research on exposure to existing SoMe were both included. Only English language papers were included. Full inclusion and exclusion criteria are reported in appendix 1.

Defining SoMe has become increasingly challenging as platforms diversify. We accept in principle the definition of SoMe articulated by Cheston et al, later adopted by Sutherland and Jalali, describing SoMe as “Web-based technologies that facilitate multi-user interaction that goes beyond fact sharing”17,19.

Given the evolution of SoMe since development of this definition in 2013, more recent examinations should be considered. Chan et al (2020) highlight that platforms “facilitate creation and distribution of content”, which may be “user-generated or user-curated” to “virtual communities of practice24. We would therefore add to Cheston et al’s definition that ‘such interactions may take place in either public or private domains’, stipulate that ‘the primary purpose of the platform must be multi-directional interaction’ and ‘be centred around content creation, curation and community’. Using our adapted definition, we considered true SoMe platforms to place user interaction at their heart. We therefore exclude websites or blogs which happen to feature a comments page, as “multi-directional interaction” is a secondary purpose in these instances. We also exclude podcasts on the basis that they are generally unidirectional in nature. YouTube was included as user creation is often driven by community comments, users may curate content and video replies are common.

We defined undergraduate medical education as any educational aspect of the period between commencement of medical school and graduation.

**Screening of studies**

All titles were independently screened by two reviewers (from MU, AA, OB, JA, AO, TC). Reviewers prioritised sensitivity over specificity at this point, so any titles that could *potentially* have been relevant to our review objective were included. Disagreements progressed to abstract screening in order to enable a more informed decision to be made.

Abstracts of all papers included from title screening, and all papers identified through reference and hand searching were screened against inclusion criteria by two reviewers (from MU, AA, OB, JA, AO, TC). If it was not clear from the abstract whether the paper met the inclusion criteria, it was included for full text screening. Disagreements at outcome or criterion level (i.e. both reviewers elect to exclude but based on different exclusion criteria) were resolved by a third reviewer (ER or JG).

Papers that met inclusion criteria in abstract screening, or for which insufficient information was presented to enable a judgement, were read in full and reviewed again against the review’s inclusion and exclusion criteria. Full paper screening was conducted independently by two reviewers (ER & JG). Conflicts were resolved through discussion.

**Data extraction**

A pilot data extraction form was developed. All reviewers independently reviewed two papers and met to ensure we were extracting consistently and to revise the fields in the coding form. Once the form was finalised, all reviewers independently reviewed a further two papers and met to ensure consistency. Following this pilot phase, all papers were reviewed by two reviewers (one from MU, AA, OB, JA, AO, TC and either ER or JG).

The following data were extracted:

* Participants (country, profession, stage of training, number)
* Intervention (focus, aim, brief overview, duration, SoMe platforms used) or Exposure (research question, overview of exposure, SoMe platforms investigated)
* Evaluation methods (impact of intervention using modified Kirkpatrick’s hierarchy25, study design, data collection methods)
* Results (summary, results for each Kirkpatrick level investigated, key conclusions)

We calculated kappa values for full data extraction and quality assessment.

**Assessment of methodological quality**

All included papers were assessed for their methodological quality using two or more tools.

Depending on whether papers employed quantitative and/or qualitative methods, they were assessed for their methodological quality using the Medical Education Research Study Quality Instrument (MERSQI) and/or the Standards for Reporting Qualitative Research (SRQR) instrument, respectively. The MERSQI is a tool containing 10 items in six domains: study design, sampling, type of data, validity of evaluation instrument, data analysis, and outcomes26. The SRQR comprises of 21 reporting standards for high quality qualitative research27.

Papers describing educational interventions were assessed for risk of reporting bias using the risk of bias measure described by Gordon *et al.* (2020)28. This assesses risk of bias due to incomplete reporting of educational interventions. Included papers were assessed against five sources of potential bias using a three-point scale. Papers that provided adequate description were considered low risk of bias, those that provided some but insufficient details were rated as unclear risk of bias, and those that did not provide any details were rated as high risk of bias. The potential sources of bias considered were the theoretical underpinning of the development, the resources required, the setting, the educational methods employed, and the content.

An overall rating of the strength of the conclusions drawn by the authors was made using the BEME collaboration’s five-point scale25.

**Synthesis of evidence**

Extracted data were synthesised using narrative synthesis. This involve synthesising the findings from primary studies textually, without conducting meta analyses29. This approach enabled this review to synthesise findings from both qualitative and quantitative studies to provide a comprehensive synthesis of the research literature in this field30. The review group met virtually each week throughout the data extraction and synthesis phases to discuss evolving findings. We constructed overview findings for the subgroups of intervention studies and exposure studies. We undertook conceptual mapping to identify themes within which to synthesise and present the findings of primary studies31.

**Results**

Database searches yielded a total of 1,442 papers. A further 321 papers were identified through reference and citation searches, and 44 through hand searching. Deduplication identified 720 duplicates, leaving 1087 papers for screening. Title and abstract screening excluded 327 and 441 papers, respectively. After reviewing the full texts of 319 full papers, 112 met our inclusion criteria and were included in the final review. An illustration of record flow can be found in Figure 1. Weighted overall Kappas for data extraction, and quality assessment using MERSQI and SRQR were 0.98, 0.96 and 1.00, respectively.

[INSERT FIGURE 1]

**Details of included papers**

The studies included participants from 26 different countries across six continents: Asia (37), North America (33), Europe (28), Australia (20), Africa (1), and South America (1). There were an additional six international studies that included participants from multiple countries.

Thirty-nine papers included preclinical students, 32 included clinical students, 21 included all stages of students, and 20 did not describe the stage of included medical students. For the purposes of this review, preclinical students were in Years 1 and 2 whilst clinical students were in Years 3, 4 and 5. Fourteen studies also included postgraduate clinical trainees, 10 included non-training grade doctors (e.g. consultants / attendings, general practitioners), 7 studies included other health professionals, and 17 included other students. There was a total of 35,428 participants across the included studies. These consisted of a median (range) of 151 (6-4244) participants per study.

**Summary of SoMe interventions / exposures**

Twenty-nine different SoMe platforms were studied. The most common was Facebook (65/112, 58%), followed by Twitter (37/112, 33%) and YouTube (33/112, 29%). Forty (36%) studies investigated the use of more than one SoMe platform.

Fifty-eight out of the 112 included studies (52%) involved the development of novel SoMe teaching (intervention studies) whilst the other 54 (48%) focused on how students currently utilise SoMe platforms in medical education (exposure studies).

*SoMe Interventions*

Novel SoMe interventions were created with the aims of: (i) improving knowledge and skill development; (ii) supporting curricular activities; (iii) assessing the acceptability of SoMe.

Types of knowledge and skill development included information acquisition and retention32–44, reflection45–47 and professionalism40,48–57. Supporting curricular activities ranged from enhancing student engagement58–68, reducing student anxiety with the taught material69–71 to improving communication between faculty and students69,72–74 and between students themselves outside of the classroom38,69,75,76. Many interventions were evaluated to assess student opinions and attitudes towards inclusion of SoMe within their medical curriculum8,14,34,49,70,77–87. Privacy was a focus of 28/58 (48%) SoMe interventions with the use of closed groups32,45,48,68,70,72,74,75,87,88, private communication platforms such as WhatsApp and WeChat14,33–38,50,51,60,62,66,78,80–83 and even a bespoke institution-specific SoMe platform53. 16/58 (28%) studies involved case-based or problem-based learning8,14,35,39,48–50,54,62,65–67,74,78,83,87.

*Exposures to SoMe*

Of the 54 included studies addressing exposures to SoMe-mediated medical education, the most prevalent focus was assessing usage patterns of SoMe platforms by students, seen in 38 studies (70%). Projects looked to identify SoMe platforms and services most commonly used89–92 and the duration or purpose of such use93–95.

The second major theme was that of professionalism (17/54, 31%). In particular, student and faculty behaviour online was analysed for whether these behaviours met regulator standards96,97. Questions were raised as to whether SoMe makes students and doctors more likely to have lapses in professional behaviour98, whether guidelines in professional SoMe use are necessary99, and who should be responsible for producing and leading them100–102. Several studies explored professionalism in the context of acceptable patient interaction103,104.

The findings from included studies have been grouped thematically in to six groups: usage, acceptability, educational activity, academic performance, professionalism, and health risks.

**Usage**

SoMe use by undergraduate medical students is widespread105. Facebook was identified as the most popularly used platform amongst this group90,94, although YouTube and WhatsApp were the most favoured platforms for educational content89. Between a third and a half of students used social media for educational purposes on a daily basis89,90. Frequency of social media usage was not associated with gender or academic year 106. Stopping of the use of Facebook was associated with a sense of loss107.

**Acceptability**

SoMe was generally perceived favourably by medical students. Enjoyment and engagement with various SoMe platforms was described. Only two studies differed: one found students’ opinion on SoMe efficacy to be ‘divisive’90, whilst another described less than half of their student population finding a SoMe intervention useful in their studies58.

Usability was key to effective SoMe use in medical education14,36,63,77,108–110. Familiarity with SoMe platforms was a mediator of success. Indeed, unfavourable student reviews were reported when unfamiliarity was highlighted58. One study with a bespoke SoMe platform reported that students required greater accessibility and a more user-friendly interface53. Technological issues and poor digital literacy may contribute to inconsistencies in the effectiveness of SoMe interventions62,66.

The amount of information presented via a SoMe platform contributed to its effectiveness. Students preferred short content44,77,81,85 with the “time-consuming” nature of searching SoMe for relevant information contributing to ineffectiveness111,112. It is suggested that the need to regularly check SoMe to keep up to date with content contributes to such inefficiencies; however, push notifications may improve this38,63. Type of educational information was also important, with many studies reporting a preference for SoMe posts that inform and test, for example, quizzes109,113 and images with missing labels64. Visual posts with images85 and videos114 were suggested to be effective methods of disseminating information on SoMe, with one study reporting that highly visual platforms such as Instagram and Snapchat are the most popular amongst students for medical education115.

One study argued that SoMe platforms may be perceived as more user friendly and less academic than institutionally designed solutions. This study used Facebook and YouTube to deliver peer developed resources to alleviate stress and depression amongst recent entrants to medical school70. Contributions were monitored by a trained mental health professional.

One concern with SoMe in medical education was the lack of critical appraisal performed by students on the information presented75,84,108,116. Content creation by faculty members61,76,108 may be a solution to this but adds to the workload of the educators114. Many studies argue that training is required for both staff and students to capitalise on the benefits of SoMe interventions in medical education8,49,62,75,79,101,117,118.

**Educational activity**

Social media platforms were used in myriad ways. Educators used them to share resources, establish dialogue with students, and facilitate classroom activities. Students used them for informal conversation, for accessing and sharing educational resources, to arrange educational and social events, to discuss opinions, and to participate in surveys, quizzes and educational games90,109,110,113.

Several studies delivered structured teaching using social media platforms6,36,48,65,85. Use of social media within structured learning activities was found to improve communication and participation82,88, and facilitate teamwork62,82.

Several studies reported that SoMe initiatives made students feel more able to ask questions to their peers, compared to asking questions in a clinical setting87, in part driven by an expectation that they would generally receive answers to questions more quickly from a multitude of voices, especially international professionals74,119. Students reported a change in the student-educator relationship14,37,120. They perceived SoMe as having “flattened hierarchies”, allowing students to feel more comfortable interacting with educators14,121. Similar improvements furthered peer communication and working,62,88 with facilitators in one study noticing greater student collaboration with SoMe62. Students reported newfound appreciation and interest for the subject material when presented with novel SoMe options for learning e.g. videos on YouTube59 and discussion groups on Facebook64,88.

SoMe was also commonly used to supplement classroom teaching62,67,72–74. One study utilised SoMe to create a ‘flipped classroom’ in which a case was reviewed by participants on Twitter before classroom sessions67. Classroom discussions were described as more efficient, and Twitter lessened educator burden. SoMe was found to enhance communication and collaboration between students and educators69,72,74,106,112 as well as students and their peers62,69,72,83,106,112,122.

Students reported SoME facilitated them being more productive in their studies16, and enabling them to work faster120. Video based SoMe platforms were considered to be particularly useful95,114,116. SoME was also considered useful in supporting reflective practice46.

Finally, SoMe was considered useful in learners’ professional identity formation53,118.

**Academic performance**

Subjective improvements in students’ self-reported performance56,60,63,123,124 and objective increases in assessment outcomes33,35,38,40,69,82,125 were reported, including in two studies with controlled designs32,80. However, it is unclear whether the differences found in the latter two studies result from the use of SoMe or other confounding variables such as weekly assessment32 or earlier exposure to educational material80. Some studies showed that rate of utilisation of SoMe positively correlated with test score37,39,69, however others suggested time spent on SoMe had no impact on knowledge improvement126. Furthermore, most interventions tested participants' knowledge and skills acquisition in the short term, with limited findings on longer term effectiveness44. Knowledge retention in the long term may be poorer with SoMe learning compared to lecture-based learning39.

Three studies demonstrated no effect from SoMe on academic performance34,36,61. However, one studied ‘technology enhanced learning’ (including SoMe), making it difficult to identify any SoMe specific results61 and another did not assess baseline knowledge between the experimental and control group prior to intervention34. In one study, students linked social media use to subjectively worse test performance127.

The studies reporting higher academic performance tended to be dialogue-focused, using push notifications, poll quizzes and closed communities of practice. They generally used WhatsApp, Facebook Groups and WeChat.

**Professionalism**

One concern with the use of SoMe was maintaining professionalism. One study assessed students’ Facebook activity levels and perceptions of guidelines for professional behaviour128, while another tested their response to simulated medical professionalism scenarios. The latter demonstrated an inverse correlation between having a personal board on PTT, Taiwan’s largest SoMe platform and humanism, as well as a similar correlation between SoMe use and medical professionalism scores128. This was despite the fact that SoMe use was actually associated with increased awareness of the need for professional behaviour on SoMe128. Additionally, despite this negative correlation, some students highlighted that SoMe, specifically Twitter, allowed them to develop empathy and understand previously unknown elements of patient experience119.

One study indicated that simply by surveying students on contentious behaviours (in this case patient-targeted googling, PTG) the act of surveying may reduce incidence of such behaviours129. Students involved favoured more explicit teaching around PTG and such surveys may represent an opportunity to improve levels of professionalism.

Multiple studies found that students’ behaviours were subject to change with the knowledge that their peers would be able to view the content they posted45,52. This may be linked to increasing awareness of professionalism, and one study found that approximately 11% of the SoMe profiles assessed were deemed to have committed some form of violation130.

Two articles indicated that in response to participating in the study, students would actively change their SoMe profiles to be less publicly accessible 52,54.

Even though students understood the need for professionalism when using SoMe for medical education49,93,107,125,131,132, they appreciated educational interventions with regards to this40,56,133,134. Studies suggested privacy concerns were a barrier to effective SoMe use 47,64,69 but closed SoMe groups or bespoke networks may alleviate such concerns53,74. This does, however, limit global interactions53 and only three studies identified accessing expertise from around the world as an advantage116,74,119.

**Health risks**

Medical students generally reported using SoMe for at least six hours per week135, reporting poor health behaviours when using Facebook such as holding urine, skipping meals, and midnight logins, leading to disturbed sleep105,136, headaches, back and shoulder pain and eye irritation 137. One study linked SoMe use to increased risk of anxiety & depression138, whilst two suggested SoMe may contribute to social isolation137,139.

**Methodological quality of included papers**

Eighty-four (75%) papers utilised quantitative (including mixed methods) designs. The mean (SD, range) MERSQI score for these papers was 9.1 (2.3, 5-14) out of 18 (Table 1). These studies predominantly employed a single group design with a single data collection point (63, 75%), at a single institution (73, 87%), using subjective data (60, 71%). Almost half (38, 45%) of these studies reported descriptive statistics only, although 88% were considered to be appropriate for the design and types of data collected. The domain with the poorest scores was the validity of the evaluation instruments used.

[INSERT TABLE 1]

Thirty-one papers utilised qualitative designs. The mean (SD, Range) SRQR score was 9.03 (3.99, 2-16). Included studies were strongest at reporting the context (30/31, 97%), data collection methods (28/31, 90%), units of study (25/31, 81%), sampling strategies (23/31, 74%), data analysis methods (22/31, 71%), and ethical issues (22/31, 71%). They were weakest at providing rationales for techniques to enhance trustworthiness (2/31, 6%), data analysis methods (4/31, 13%), sampling strategies (7/31, 23%), data collection methods (12/31, 39%), and describing researcher characteristics and reflexivity (13/31, 42%).

Overall, the risk of bias in reporting educational interventions was reasonable (Figure 2). There were no sources of bias where over 50% of papers were considered to be low risk of bias. The highest sources of potential bias were in reporting details regarding the settings in which interventions took place and in the educational methods used.

[INSERT FIGURE 2]

Finally, the modal (mean, range) strength of conclusions was 3 (2.95, 1-4) indicating that these conclusions could probably be based on the results.

**Discussion**

This review identified 112 articles studying SoMe use in undergraduate medical education. Students generally have a favourable view of using SoMe for their learning, particularly when engaging with content hosted on familiar platforms and provided in small chunks. Acceptability is driven by the perceived flattening of hierarchies, improved accessibility to faculty and platform novelty. There is some evidence of SoMe interventions resulting in improved learner performance, though this is mainly limited to self-report, non-controlled studies or short-term changes. SoMe interventions which encourage dialogue between educator and student or between peers are most effective. Whilst students have reservations about professional conduct on SoMe, educational interventions aimed at developing professional SoMe behaviours are appreciated and appear to be effective. The methodological quality of studies investigating SoMe in medical education remains poor.

**Methodological quality of primary studies**

It is telling that our review has included 98 more studies than a review in 2013 and 83 more studies than one in 2017, demonstrating the proliferation of SoMe in educational scholarship17, 140. This review considers a wider variety of platforms that focussed on multi-directional communication than earlier investigations. Previous reviews were mostly comprised of blogs and Wikis17, which were excluded in this review.

However, this profound increase in studies has not been matched by an increase in quality. The mean (SD, range) MERSQI of previous reviews were 8.89 (3.39, 5-15.5)17, and 9.57 (2.02, 7.5-14.5)140. Our review identified a mean between those of these two previous reviews, and a lower maximum MERSQI score. While ours is the first SoMe review to use the SRQR to assess methodological quality of qualitative research, Sterling’s review140 reported reasonable quality of included qualitative research using the COREQ criteria (Consolidated Criteria for Reporting Qualitative Research)141. This suggests that while much of the literature on SoMe remains of relatively poor quality, research on SoMe in graduate medical education appears to be of higher quality.

Several previous studies have examined the impact of SoMe upon student outcomes, with focuses on impact upon knowledge. Whilst Cheston’s review concluded that their intervention studies led to equivalent test scores for students who did and did not use SoMe tools17, another found Facebook to be beneficial to the affective aspects of learning and YouTube to be an inadequate source of information for medical education19. However, the latter review describes its study outcomes as weak, poorly transferrable and relying on self-reporting. Our results conversely demonstrate subjective and objective knowledge improvement across several platforms, however, cautions against the relatively strong likelihood of confounders, suggesting that the benefits are likely limited to the short term. We echo the findings of Chan et al (2020), where the majority of studies consisted of descriptive research, assessed lower-level Kirkpatrick hierarchies and were methodologically dominated by single-centre quantitative surveys24.

Whilst SoMe platforms have grown in number across reviews and time, the subject of investigation by studies does not appear to have changed dramatically. The dominant themes explored by Cheston et al (2013), namely professionalism and improvement in knowledge, are reflected in this review, in addition to that of Sterling et al (2017) and Sutherland & Jalali (2017)17,19,140.

**Strengths and limitations**

While this is not the first systematic review of SoMe use in undergraduate medical education, we have identified significantly more papers than previous reviews. We believe this review has benefited from a rigorous and sensitive search strategy including multiple databases, reference, citation, and hand searching. We have benefitted from the insights and interpretations of both medical students and medical school faculty in the extraction and synthesis of original papers. We have included studies evaluating interventions and those researching exposure to SoMe, resulting in a comprehensive synthesis.

These strengths notwithstanding, this review does have some limitations. Firstly, while we believe the focus on undergraduate medical education is a strength, it also limits the generalisability of these results to other groups of learners. SoMe is used in different ways by practicing physicians and therefore assumptions cannot not be drawn regarding outcomes in SoMe across the spectrum of medical education. We did not contact authors of included studies for missing data, further details or to identify other relevant or forthcoming literature. We have only included published journal articles in this review and have excluded conference abstracts. This may have resulted in the omission of innovative SoMe approaches that have not yet materialised in the peer reviewed literature. Finally, as with all reviews, the results of this review are limited by the quality of the primary studies available for inclusion.

**Implications for practice and research**

For the educator designing social media education tools, best practice appears to be grounded in familiarity and features intensive induction for staff and learners. The most subjectively appreciated interventions appear to be highly visual, curated by faculty and blended with classroom teaching. When considering the strongest evidence for improving objective outcomes, initiatives featuring collaborative, text-based discussion seem most effective. Examples of such activities include case-based discussion, SoMe journal clubs, poll-based quizzing and smaller, near-peer communities of practice. Existing studies suggest that instant messaging services such as WeChat and WhatsApp are most likely to provide the intensive dialogue to facilitate learning. Perhaps unsurprisingly, students who engage more with SoMe comments perform best in objective assessments.

This review may inform educators in navigating SoMe professionalism concerns. Despite feeling that professionalism guidelines are poorly understood, the evidence presents a clear picture of a learner population motivated to champion professional practice on SoMe. Students appreciate professionalism teaching, quickly respond to constructive criticism on SoMe privacy and even seek out professional development opportunities on platforms. In terms of practical guidance, it is clear that a fear of appearing unprofessional in front of peers or patients can hamper engagement with SoMe initiatives. Therefore, use of closed groups may provide reassurance to both educator and learner.

This review has a number of implications for the direction of future research. As detailed above, the community should prioritise undertaking fewer, higher quality studies, rather than the current high output of methodologically weak research. The quality of the current evidence base should provide a roadmap for this work. Considering this review’s quantitative studies, the majority of the highest quality articles (MERSQI 12-14, n=12) investigated outcomes related to blended learning (9/12, 75%), compared to one each on professionalism, reflection and the humanities. Conversely, the lowest quality studies (MERSQI 5-7, n=20) featured a majority of these latter categories. Professionalism (7/20) was particularly poorly investigated whilst SoMe use in the humanities represented three of the four lowest scored studies in this review.

Interestingly, this pattern was inverted in the review’s qualitative studies. Half of the top 10 highest SRQR scores (12-16), including the top two studies, focus on professionalism. This is perhaps an indication that investigating professionalism should be the domain of richer, in-depth qualitative research.

Whilst understanding professionalism was a key tenet of numerous papers in this review, how this is explored should be carefully considered. A recent study of unprofessional behaviour amongst vascular surgery trainees was retracted after a surge of concerns were raised by the medical community142. Such complaints focused on the ‘shaming’ of professionals, particularly females143, and the invasive, covert methods applied by the authors to investigate unprofessionalism. It should be highlighted that our review includes three papers which systematically searched for participant profiles, collected or reviewed personal data including photographs and made subjective judgements regarding their professionalism52,96,130. Such methods are at high risk of researcher prejudice and there remains no validated tool to measure SoMe professionalism. We would suggest that future researchers maintain their own professional and ethical standards by avoiding invasive, subjective judgements and instead pursue higher quality methods of investigating such a complex phenomenon. This review serves as a reminder to educators that despite regulator guidance and much research, there is limited consensus on SoMe professionalism.

Considering the widespread perceived concerns regarding SoMe professionalism and associated guidelines, particularly given the proven hindrance such fears have upon learner engagement, we suggest that the next step for SoMe research lies in this domain. We call for a rigorous investigation to build a community consensus on SoMe professionalism.

We must also urgently reflect on how we undertake research in this field. Whilst we have examined research encompassing a diverse range of rapidly emerging platforms, we suggest a reactionary approach to SoMe research is inappropriate. Future work should focus instead on the common factors across the spectrum of social media in order to address the significant gaps raised by this review. Specifically, we recommend study of the impact of a range of SoMe platforms upon long-term knowledge retention, largely absent from the current literature. Additionally, robust assessment of measures to prevent the SoMe harms highlighted in this review is essential.

When considering commonalities between platforms, one must consider the underpinning theory on SoMe. SoMe platforms have their functional differences but educationally the principles are the same: these are rapid, often short-lived6 communities of practice11 built on complex socially constructed values145, which themselves fluctuate across locations and generations107. Brief community lifespan perhaps explains why long-term outcomes have so far proven challenging to establish. The ever-changing norms of communities and tensions between clinical environments and online spaces may contribute to a difficulty in defining SoMe professionalism.   
Moreover, placing our results in the context of theoretical principles may advance deeper thinking on SoMe in health professions education. That objective performance benefit is driven by rapid peer-led dialogue highlights the primacy of the community of practice in effective SoMe interventions. Community of practice as a theoretical construct underpinned the majority of the most effective interventions in this review and has been at the focus of rigorous investigations on enhancing knowledge translation in wider healthcare education146. Connectivism, whilst a theory literally established for the online environment15

, is largely knowledge-centred rather than community-focused. Community appears to dominate social media educational practice, shaping both effective and ineffective learning cultures. This suggests that communities of practice is a more coherent and informative theoretical construct than connectivism in explaining effectiveness in social media education.

**Conclusions**

Despite an explosion of research surrounding social media in medical education, understanding of this social phenomenon has not significantly progressed in almost a decade. We have established that social media is enjoyable for students, may improve short term knowledge retention and can aid communication between learners and educators. However, students and educators alike remain wary of professionalism concerns and warnings against potential SoMe harms remain.

We suggest that rather than attempting to undertake superficial evaluation of the latest SoMe trend, the community should instead consider longer-term, higher quality research, rooted in the underpinning educational theories which unite these diverse platforms.

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Figure 1. PRISMA diagram of studies

Diagram

Description automatically generated

Figure 2. Risk of bias in reporting educational interventions in included studies

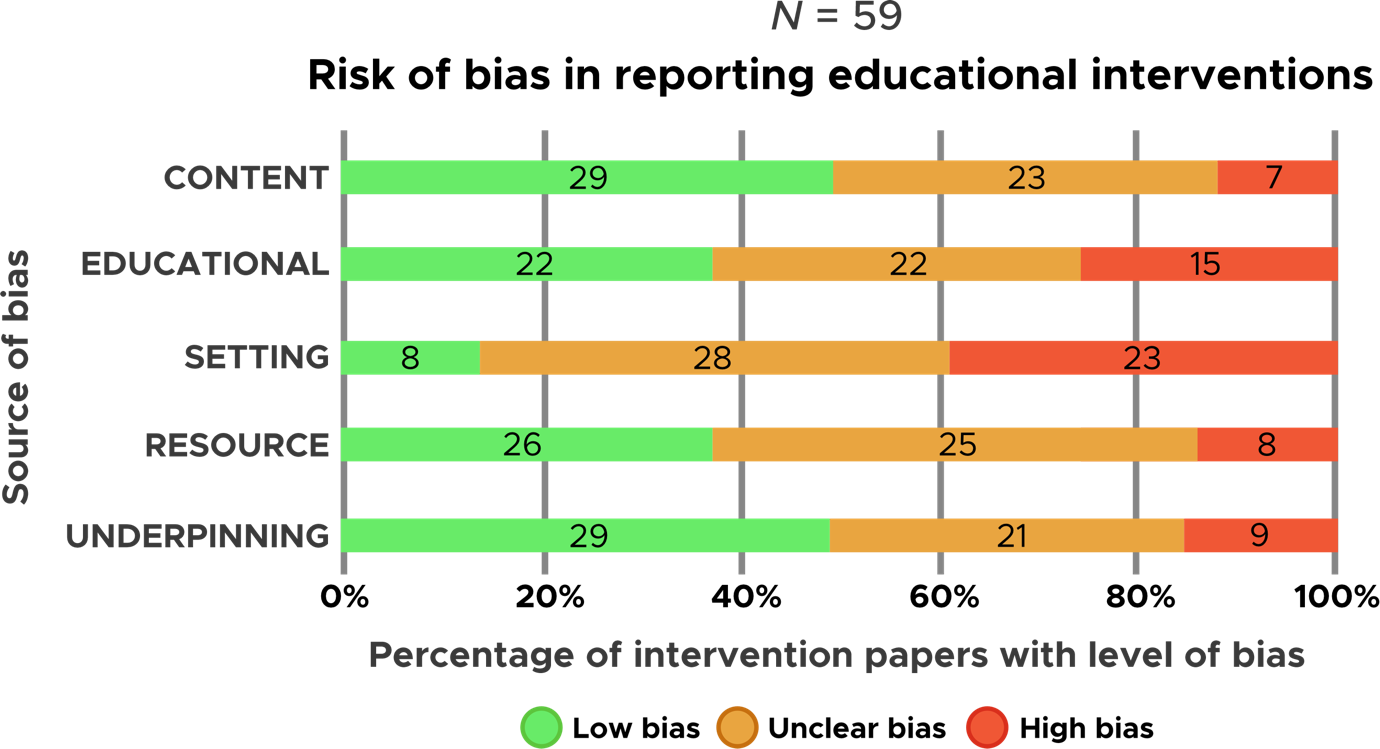


Table 1. Medical Education Research Study Quality Instrument (MERSQI) scores for included quantitative studies.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Domain** | **MERSQI Item** | | **Studies** | | **Score** | | **Mean (SD)** | | | |
|  |  | | **No.** | **(%)** | **Item** | **Maximum Domain** | **Item** | | **Domain** | |
| **Study design** | 1. Study design | |  |  |  | 3 | 1.23 | 0.47 | 1.23 | 0.47 |
|  | Single group cross-sectional or single group post-test only | 63 | 75% | 1 |  |  |  |  |  |
|  | Single group pre-test and post-test | 10 | 12% | 1.5 |  |  |  |  |  |
|  | Nonrandomised, 2 group | 8 | 10% | 2 |  |  |  |  |  |
|  | Randomised control trial | 3 | 4% | 3 |  |  |  |  |  |
| **Sampling** | 2. No. of institutions studied | |  |  |  | 3 | 0.63 | 0.33 | 1.52 | 0.55 |
|  | 1 | 73 | 87% | 0.5 |  |  |  |  |  |
|  | 2 | 1 | 1% | 1 |  |  |  |  |  |
|  | >2 | 10 | 12% | 1.5 |  |  |  |  |  |
| 3. Response rate, % | |  |  |  |  | 0.99 | 0.45 |  |  |
|  | N/A | 8 | 10% |  |  |  |  |  |  |
|  | <50 or not reported | 32 | 38% | 0.5 |  |  |  |  |  |
|  | 50-74 | 14 | 17% | 1 |  |  |  |  |  |
|  | ≥75 | 30 | 36% | 1.5 |  |  |  |  |  |
| **Type of data** | 4. Type of data | |  |  |  | 3 | 1.57 | 0.91 | 1.57 | 0.91 |
|  | Assessment by study participant | 60 | 71% | 1 |  |  |  |  |  |
|  | Objective measurement | 24 | 29% | 3 |  |  |  |  |  |
| **Validity of evaluation instrument** | 5. Internal structure | |  |  |  | 3 | 0.29 | 0.46 | 1.06 | 1.01 |
|  | N/A | 4 | 5% |  |  |  |  |  |  |
|  | Not reported | 57 | 68% | 0 |  |  |  |  |  |
|  | Reported | 23 | 27% | 1 |  |  |  |  |  |
| 6. Content | |  |  |  |  | 0.56 | 0.50 |  |  |
|  | N/A | 2 | 2% |  |  |  |  |  |  |
|  | Not reported | 36 | 43% | 0 |  |  |  |  |  |
|  | Reported | 46 | 55% | 1 |  |  |  |  |  |
| 7. Relationship to other variables | |  |  |  |  | 0.24 | 0.43 |  |  |
|  | N/A | 1 | 1% |  |  |  |  |  |  |
|  | Not reported | 63 | 75% | 0 |  |  |  |  |  |
|  | Reported | 20 | 24% | 1 |  |  |  |  |  |
| **Data analysis** | 8. Appropriateness of analysis | |  |  |  | 3 | 0.88 | 0.33 | 2.43 | 0.65 |
|  | Data analysis inappropriate for study design or type of data | 10 | 12% | 0 |  |  |  |  |  |
|  | Data analysis appropriate for study design or type of data | 74 | 88% | 1 |  |  |  |  |  |
| 9. Complexity of analysis | |  |  |  |  | 1.55 | 0.50 |  |  |
|  | Descriptive analysis only | 38 | 45% | 1 |  |  |  |  |  |
|  | Beyond descriptive analysis | 46 | 55% | 2 |  |  |  |  |  |
| **Outcomes** | 10. Outcomes | |  |  |  | 3 | 1.31 | 0.39 | 1.31 | 0.39 |
|  | Satisfaction, attitudes, perceptions, opinions, general facts | 47 | 56% | 1 |  |  |  |  |  |
|  | Knowledge, skills | 22 | 26% | 1.5 |  |  |  |  |  |
|  | Behaviours | 15 | 18% | 2 |  |  |  |  |  |
|  | Patient/health care outcome | 0 |  | 3 |  |  |  |  |  |
| **Total Score** |  | |  |  |  | 18 |  |  | 9.11 | 2.30 |

Appendix 1. Full search terms for MEDLINE

|  |  |
| --- | --- |
| **S1** | (MH "Social Media") |
| **S2** | TI "social media" OR AB "social media" |
| **S3** | TI "social network\*" OR AB "social network\*" |
| **S4** | TI facebook OR AB facebook |
| **S5** | TI twitter OR AB twitter |
| **S6** | TI instagram OR AB instagram |
| **S7** | TI whatsapp OR AB whatsapp |
| **S8** | TI snapchat OR AB snapchat |
| **S9** | TI tiktok OR AB tiktok |
| **S10** | TI messenger OR AB messenger |
| **S11** | TI wechat OR AB wechat |
| **S12** | TI linkedin OR AB linkedin |
| **S13** | TI vine OR AB vine |
| **S14** | TI youtube OR AB youtube |
| **S15** | TI tumblr OR AB tumblr |
| **S16** | TI pinterest OR AB pinterest |
| **S17** | TI vk OR AB vk |
| **S18** | TI telegram OR AB telegram |
| **S19** | TI reddit OR AB reddit |
| **S20** | TI bebo OR AB bebo |
| **S21** | TI myspace OR AB myspace |
| **S22** | S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 |
| **S23** | (MH "Education, Medical, Undergraduate") |
| **S24** | (MH "Students, Medical") |
| **S25** | (MH "Schools, Medical") |
| **S26** | TI "medical education" OR AB "medical education" |
| **S27** | TI "medical student$" OR AB "medical student$" |
| **S28** | TI "medical training" OR AB "medical training" |
| **S29** | TI "medical curricul\*" OR AB "medical curricul\*" |
| **S30** | TI "clinical education" OR AB "clinical education" |
| **S31** | TI undergraduate OR AB undergraduate |
| **S32** | TI medic\* OR AB medic\* |
| **S33** | S31 AND S32 |
| **S34** | S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S33 |
| **S35** | S22 AND S34 |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Study ID** | **N** | **Overview of intervention** | **Social media platforms used** | **Overview of evaluation methods** | **Summary of results** |
| Abbas 201984 | 27 | A Facebook video series providing up to date information on medical technologies and recent developments across medicine. | Facebook, YouTube | Survey. | All participants reported that the content engaged them, inspired them and inform them. They reported that videos were a good delivery method. All but one felt that social media was an effective way of teaching. |
| Amgad 201441 | 156 | Various social media platforms integrated into a research and management course and facilitate communication. | Facebook, Twitter, YouTube, Google+, Google Hangout | Online questionnaire after course completion assessing perception of using social media tools. | Most students found that social media networks were useful in this course with many stating that it made the course "more intellectually stimulating". |
| Awan 201862 | 46 | PBL sessions were provided for students and presented with social media incorporated. Virtual facilitation. | WhatsApp | Survey evaluation | Students agreed that social media improved communication skills during class, provided feedback in a timely manner, and had increased their teamwork. |
| Bahner 201277 | 27 | Daily high yield ultrasound concepts tweets including facts, images and links to other resources shared on Twitter and Facebook. | Facebook, Twitter | A survey posted on social media accounts at the end of the course. | Most found Twitter feed user-friendly and would like to follow more educational feeds. |
| Bramstedt 201456 | 167 | Compulsory online session in social media ethics for medical students featuring a YouTube Video, hosted on SurveyMonkey | YouTube, SurveyMonkey | Responses to scenarios collected and analysed, plus evaluation survey. | 73% Agreed or Strongly Agreed the course session would aid their professionalism skills and behaviours, and 95% supported delivery of the curriculum online. |
| Brown 201945 | 122 | One group submitted reflective writing via traditional electronic platform (Catalyst). The other group used a secure social media site (Yammer), which involved peer discussion. | Yammer | Reflection Evaluation for Learners' Enhanced Competencies Tool (REFLECT) was utilised to compare reflections. Survey of social media perceptions. | There were no significant differences between the REFLECT scores of those using social media versus the traditional platform. 72% of students felt comfortable sharing their reflections and 84% of students felt comfortable commenting on peer reflections. |
| Cole 20178 | 71 | Scoop.it and a Campus Pack wiki were implemented as part of case-based learning. Facebook was used to communicate during the process. | Facebook, Scoop.it | Surveys, metrics on posts and views of topic pages on Scoop.it, group activities on the wiki were used to evaluate. | Students develop preferred way of working early in course (Facebook mostly used). More barriers using wiki and Scoop.it. Some groups did use these extensively, but not all. |
| Dressler 201846 | 56 | Students required to write 3 reflections in the form of Tweets. | Twitter | Tweets analysed through thematic coding. | 52% reflective. Mix of positive, negative and indeterminate valences (42%, 27% and 32% respectively). Mix of content: 54% on patient interaction, 34% on educational experience, 27% physician interaction and 11% on career choice. |
| Duke 201550 | 259 | For a professionalism course, virtual classrooms for 31 small groups were created using Google+ Hangouts coupled with Blackboard to post course information and assignments. | Google+, Google Hangout | Survey | 70% agreed that the small peer group enhanced their understanding of challenges during medical training and 74% noted it acted as a source of social support/peer support. Students gained a sense of normalisation of experiencing difficult situations. |
| Dyavarishetty 201735 | 49 | Case studies posted on WhatsApp group with mainly online discussion and adjunct classroom discussion. | WhatsApp | Pre-test and post-test scores, record of participation in online discussion, feedback forms and in-depth interview. | Significant improvement in average marks scored for the modules. About 90% students perceived WhatsApp as an effective tool for teaching/learning. |
| Ekarattanawong 201574 | 177 | A Facebook page was set up to support a PBL course on the genitourinary system. | Facebook | Questionnaire. Student opinions were analysed according to academic performance in a summative assessment at the end of the course. | Students liked the page as it allowed for quicker responses to questions. Students did not feel stimulated by the Facebook page in their self-directed learning activities. |
| El Bialy 201468 | 220 | The use of Facebook Pages and Groups were incorporated into histology and anatomy teaching. | Facebook | For histology group: online survey questionnaire  For anatomy page: paper-based surveys and insights tool of Facebook | Facebook was a time effective way of communication with easy access to the learning material; it was an inviting atmosphere to participate. Pages and groups are equally accepted by students. |
| Fischer 201837 | 190 | MCQs posted in Facebook group. If answered, correctly it was posted again 1 month later. If answered incorrectly, it was posted every few days until a correct answer was obtained. | Facebook | Correlation of participation rate and final scores. Students were also asked to rate their satisfaction. | Positive correlation between the participation rate and the final score. Students were generally satisfied with the intervention. |
| George 2011a47 | 30 | All course participants asked to join Twitter to communicate with instructors and students and other social networking sites were used to enrich the curriculum. | Twitter, YouTube, Skype, Flickr | Survey at the end of the course with quantitative and qualitative data collection. | Students were generally satisfied with integration of social media into course although some were initially intimidated. |
| George 2011b112 |  | Twitter, Flickr, YouTube and Skype were utilised in two electives for humanities for Year 4 medical students. | Twitter, YouTube, Skype, Flickr | Survey with free text responses. | Narrative comments expressed their satisfaction with the integration of social media into coursework and their opinion that this integration augmented learning and collaboration. |
| George 201270 |  | Using content developed from feedback by older years, they created a closed Facebook group to act as a discussion platform for sharing de-stress content | Facebook | Focus groups | Facebook group was a user-friendly form of support and easily accessible |
| George 201376 | 95 | Facebook group designed for first year medical students. Second year students helped create: personal narratives, education/information and stress-management resources. 55 YouTube videos of narratives from older students were posted. | Facebook, YouTube | YouTube analytics; focus groups; Facebook group analytics. | View count was a downward trend over time (except before an exam, where it peaked for that week). Students appreciated content through Facebook rather than email for stress management. Students enjoyed ‘insider advice’ from senior students. |
| Godfrey 201959 | 59 | An online public health course was set up including YouTube videos, TED talks and podcasts. | YouTube | A pre-test and post-test of the same MCQ quiz was set on the content of the course. Survey of perceptions on public health. | Statistically significant improvement in the MCQ scores seen in the post-test, compared to the pre-test. Student attitude that public health would impact their clinical practice rose from 22% to 33%. |
| Gomes 201754 | 313 | Facebook session encouraging active discussion and reflection, using interactive case-based discussion. | Facebook, Twitter, MySpace | Immediate reflection assessment and survey after 6 months. | In the short-term students showed a change in attitude and behaviour towards social media. In the long-term students showed a change in knowledge and behaviour towards social media. |
| Gon 201736 | 80 | One group had teaching via WhatsApp and another group had teaching done via didactic lecture. Cross over of the groups after 2 sessions | WhatsApp | Pre-test and post-test questionnaires on the topic and evaluation form | No significant statistical difference was observed between the groups in terms of post-test scores. Students reported that WhatsApp provides easy accessibility to learning materials. |
| Grover 202066 | 66 | Case-based learning (CBL) sessions using Whatsapp compared to didactic pathology lectures for the purposes of teaching pathology. | WhatsApp | Multiple-choice questions test scores obtained pre and post intervention | The mean MCQ scores obtained postintervention in CBL topics were significantly higher compared to lectures. |
| Guckian 201979 | 301 | Social media parallel course developed using Twitter, Instagram& Snapchat. Live tweeting & encouragement of content creation. | Twitter, Instagram, Snapchat | Usage analytics, questionnaire and focus group. | Use appeared to be viewing content rather than discussion or content creation. Motivational themes: peer influence, curiosity and convenience Barrier themes: cognitive load, lack of induction, peer influence |
| Hatzipanagos 201653 | 67 | University specific social networking site named KINSHIP. | KINSHIP | Online survey and interviews. | Many participants positively reflected on using KINSHIP to develop their professional profile. |
| Hennessy 201673 | 150 | Hashtag created and Widget added to university’s VLE. Teachers replied to queries and contributed to Twitter content. | Twitter | Questionnaire using multiple choice. Qualitative themes identified and coded. | Negative correlation found between time viewing tweets and examination scores. No correlation found between contribution frequency and examination scores. |
| Henry 202072 | 119 | A voluntary Facebook group for discussion between students and faculty | Facebook | Evaluation survey | Students found that the rapport with staff had been improved through the Facebook group. Students felt that they were more comfortable asking for help, that they learnt the content better and that their emotional wellbeing was improved. |
| Hsieh 201948 | 103 | A closed Facebook group was made where students posted about "positive behaviours" seen on their clinical placements. | Facebook | Analysis of Facebook posts.  Evaluation survey. | Students identified and shared good professional practice as seen on their placements. They learnt the most when their instructors were keen to teach and guide them. Students wrote more about positive traits seen in a ‘healer’ than in a ‘professional’. |
| Jaffar 201265 | 91 | YouTube channel launched to supplement PBL anatomy teaching for second year students. | YouTube | Survey at the end of the course. | 99% of students rated the channel very good or excellent. Most students agreed that the YouTube channel helped them learn anatomy. |
| Jaffar 201464 | 157 | A Facebook page was launched in 2011 and was later integrated with Twitter and YouTube channel. | Facebook, Twitter, YouTube | A survey based on literature review, professional experience and a focus group of 10 students was distributed in class. | Students liked the Facebook page and it effectively contributed to their learning. There were concerns about distractions and privacy. The Insights tool showed that there was a global fan base and the most engaging post were anatomy-related humour. |
| Jalalat 201455 | 61 | Open access medical school-run dermatology blog | Twitter | Survey. | The majority of participants reported positive reactions to the blog and found it useful for medical education & professional development in dermatology. |
| Junhasavasdikul 201785 | 161 | Cartoon/comic-based medical education resource for clinical medicine on Facebook. | Facebook | Online survey. | Participants reported positive reactions to learning physiology from cartoons on Facebook. Participants seem to prefer lower content density/page for medical education cartoons on Facebook. |
| Jurivich 201832 | 78 | An invite-only Twitter poll was set up which presented students with ten multiple choice questions surrounding geriatric topics. | Twitter | A pre- and post-test assessments for Twitter poll users versus control group. | Average test scores increased from 26.6 in the pre-test to 32.1 in the post-test. Both groups, users and nonusers, experienced an average increase in their scores, but the users of the poll gained more average marks (7.75) than the non-users (3.2). |
| Kapoor 201983 | 37 | A WhatsApp group for students to discuss cases surrounding cardiovascular disease. | WhatsApp | Pre and post multiple choice assessment of knowledge. Evaluation survey of reaction. | Statistically significant increase in the subject knowledge that was (P<0.001). |
| Keynejad 201378 | 20 | Twenty medical students from two universities met on a dedicated social media platform to discuss pre-arranged psychiatric topics. | MedicineAfrica | Questionnaires completed after meetings | Students stated the that there was a clear benefit to using MedicineAfrica, a bespoke tool for online clinical communication. |
| Khan 201733 | 72 | Three groups learned pharmacology through in-class lectures, both in-class lectures and WhatsApp and blended WhatsApp, in-class lectures and a Learning Management System respectively. | WhatsApp | Assessment outcomes and attendance | Positive correlation between marks obtained and new teaching methods. Both WhatsApp and WhatsApp + Learning Management System groups scored significantly higher than the control group (p < 0.01). |
| Lasker 201567 |  | Twitter account setup as an adjunct to classroom PBL sessions. | Twitter | Focus group discussions analysed after eight months. | Classroom sessions run more efficiently as both parties were familiar with the content of the case from Twitter. This allowed more time discussing learning points. Student-tutor relationships benefited. |
| Lie 201357 | 180 | Two seminars on professionalism in social media. Within 1 week, a written reflection was submitted. | Facebook, Twitter, LinkedIn, MySpace | Mixed methods: Primary outcome data was based from analysis of themes discussed in student reflection. Secondary outcome data was a cross-sectional survey. | 10 themes were identified in post-intervention reflections falling broadly into the categories of immediate action, intended future action, value change. At the four month follow up, 40% of 115 respondents had reviewed and edited their online presence. |
| Nanda 201960 | 82 | Students were put into a single WhatsApp group and given assignments weekly. | WhatsApp | Student feedback using WhatsApp and assessment outcomes | Most students showed interest in the intervention and felt their knowledge improved. ‘Slow learners’ show a ‘drastic improvement’ in the examination. |
| Maske 201882 | 250 | 6 months of histology teaching on Whatsapp group using digital images of histology slides. | WhatsApp | Pre-test and post-test scores, feedback questionnaire consisted of 10 close-ended questions, teachers' perceptions of the teaching method. | Students enjoyed learning using WhatsApp and had better participation than traditional teaching method. Students had a statistically significant improvement comparing pre-test and post-test scores |
| McKay 201458 | 250 | Twitter conversation complimenting face-to-face interprofessional simulation-based patient safety teaching course. | Twitter | Post-teaching course questionnaire for medical students and faculty. Content analysis of tweets. | A greater proportion of faculty found the Twitter conversation useful, as compared with medical & nursing students. |
| Mesko 201540 | 932 | 12-week curriculum based on lectures, an e-learning platform and Facebook, to teach students digital literacy. | Facebook | Pre and post-test questionnaire comparison | The course was effective at teaching digital literacy to students. The students gave positive feedback about the intervention. |
| Mohanakrishnan 201780 | 100 | Participants divided into 2 groups: experimental group were primed through WhatsApp before lectures on microbiology while control group only attended the lectures. | WhatsApp | Cross-sectional survey after session for attitudes and a post-test MCQ test for performance. | Whatsapp intervention has produced higher performance level than using didactic lectures alone. Participants perceived the new format to be more effective than traditional format. |
| Mohesh 201681 | 106 | Group admin posted optimal contents as short messages through WhatsApp every evening. | WhatsApp | Questionnaire to document the perceptions on WhatsApp learning. | Student participants liked the WhatsApp based M-learning program/ Majority agreed that this application had helped them to learn physiology on the go. |
| Nair 201834 | 105 | Experimental group had face to face plus WhatsApp messaging to achieve learning objectives. Control group had standard teaching only. | WhatsApp | Randomised Controlled Trial. Post-test consisting 20MCQ to assess performance and a questionnaire to explore students' attitudes. | There was no difference between study group and control groups in the achievement tests of Pathology students following the experimental period. |
| O'Kelly 201586 | 84 | Twitter profile @surggrandrounds created. Presenters at surgical grand rounds had presentations also tweeted on this twitter profile. | Twitter | Likert-based questionnaire | The majority of students felt that the provision of grand rounds through twitter was “useful” and easily accessible. |
| Pickering 201769 | 156 | A Facebook Page was created for an anatomy module, to allow peer-peer and student-lecturer communication. | Facebook | Contributions to the Facebook page were analysed. A 14-item survey was sent to all students. Performance on summative assessment were compared between contributing and non-contributing students. | Majority of students found that the page was effective in presenting anatomical information in an approachable format and had a positive impact on knowledge. Those who commented on the Facebook group performed significantly better on summative anatomy spotter test. |
| Pickering 201961 | 192 | Three online TEL resources made available: an eBook, an ‘anatomy drawing screencast’ on YouTube and a Massive Open Online Course. during anatomy teaching. | YouTube | Survey. | The most accessed resource was the anatomy drawing screencasts on YouTube (99%), with the MOOC being the least used resource. Females used the eBook more than males. |
| Pinilla 201575 | 1916 | Cohort specific closed Facebook groups for preclinical medical students | Facebook | Content analysis of Facebook posts & survey. | Cohort specific Facebook groups established a community for group peer mentoring. Posts increased in frequency when assessments were approaching. |
| Raiman 201714 | 19 | WhatsApp groups were created for students on clinical placements during PBL groups. | WhatsApp | Interviews & focus group, WhatsApp group chat data extracted and analysed. | Positive social atmosphere fostered in all groups. Groups benefited from resource sharing and ad hoc explanations. Convenience but lack of body language. |
| Ravindran 201487 | 68 | Private Facebook group created as a teaching forum including questions and discussion. | Facebook | Survey. | 92% believed that the forum helped to achieve the learning objectives of the curriculum. |
| Rayner 201744 | 49 | YouTube video created using a heart failure guideline. | YouTube | Staff members completed a questionnaire before and after they watched a video to assess knowledge relevant to the guideline. | Mean immediate subject knowledge improved by 39.7%. 75.5% ‘strongly agree’ or ‘agree’ that they felt the intervention improved their knowledge. |
| Reames 201663 | 64 | Delivered three succinct high-yield surgical factual Tweets daily during a 8-week clerkship. | Twitter | Pre- and post-clerkship surveys. NBME Shelf Examination scores 1 year before intervention compared to post. | 59% believed Twitter positively influenced educational experience, though 53% did not believe it influenced their clerkship engagement. Examination scores were not significantly different. |
| Robichaud 201243 | 41 | Two groups allocated to YouTube videos covering vaccines (anecdotal vs evidence-based). | YouTube | Pre and post exposure survey, with comparisons made between the two types of video (each group watched only one) | YouTube video had no impact on attitudes towards influenza vaccination. |
| Shakoori 201788 | 12 | A closed Facebook study group was established to upload learning resources and initiate discussions on physiology. | Facebook | Semi-structured interviews. | Themes were identified: Facebook group novelty, self-study motivation, research, convenience, collaborative learning and improved class attendance. Participants reported feeling more comfortable discussing queries with tutors on the group. |
| Varga-Atkins 201049 | 32 | Problem based learning groups created wikis. Students used Facebook to communicate, however this was not an intentional part of the study. | Facebook | Questionnaire & focus group | Students tended to share resources incidentally through their online social networking sites. They did not want to be seen as ‘wrong’ or ‘stupid’. |
| Walton 201552 | 152 | Faculty reviewed Facebook profiles of students and collected data on public content. This was then discussed in a professionalism session. | Facebook | Facebook profile content analysis and evaluation survey distributed after the teaching encounter. | Students felt that professionalism in social media was an important topic to address and was done so effectively. Many students changed their privacy settings after the educational intervention. |
| Wang 201738 |  | WeChat official account admin platform launched for biochemistry and cellular biology course for Chinese medical students. | WeChat | Utilised surveys, scores pre and post the implementation of WeChat, group discussions and interviews. | Significant improvement to final examination post WeChat intervention (81.5 to 83.3) Significant increased score of students who always reply with responses vs students who do not reply (84.7 vs 81.9) |
| Webb 201539 | 116 | Weekly clinical images were distributed via Twitter | Twitter | 24 question quiz and self-reported questionnaire. | A significant difference in overall scores and Twitter-only scores. There was no significant difference in lecture-only scores. Retention of knowledge was lower for students who learned on twitter vs those in lectures. |
| Woratanarat 201442 | 316 | Student groups were asked to create educational videos which were uploaded to YouTube and disseminated through a Facebook page. | Facebook, YouTube | Analysis of voluntary feedback at the of the course. | Most of the students found the activity satisfactory. |
| Zhang 201851 | 752 | A WeChat based educational course made up of three brief lessons on alcohol related facial flushing. | WeChat | Pre & post-test on facial flushing interventions with survey evaluation. | Students found it to be useful, interesting and informative. The pre- and post-test comparison, and when comparing to the control group, showed that after the intervention the students were more likely to intervene in an alcohol-related flushing incident. |

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| **Study ID** | **N** | **Overview of exposure to social media** | **Social media platforms used** | **Overview of evaluation methods** | **Summary of results** |
| Al-Dubai 2013137 | 300 | Duration of ‘Facebooking’ and related behaviours | Facebook | A self-administered questionnaire with questions on demographics, Facebook use, health related behaviours during Facebooking, perceived isolation, adverse physical health during Facebooking. | Majority reported poor health related behaviours feeling isolated and adverse physical health during Facebook use. Many were associated with number of hours spent on Facebook. |
| Alahmar 2016126 | 57 | Impact of social media on academic performance of medical students | Facebook, Twitter, Instagram, YouTube, Telegram | Time spent by students on social media and Facebook messenger was correlated with combined grades of physiology and anatomy courses. | 42%, 33% and 25% of students think SoMe had positive, negative, and no effects on academic performance, respectively. There was no statistically significant correlation between average assessment grades with the time spent on social media. |
| AlFaris 201816 | 306 | Student social media use, their reasons for using social media and their perceptions of social media. | Facebook, Twitter, Instagram, WhatsApp, YouTube, Google+, Skype, Path, Keek | Survey | 40% of the students said that they used social media to be ‘more productive in their studies’ There was no statistically significant data on the link between social media use and GPA. |
| Ali 2016122 | 24 | Use of Facebook, including groups, for medical education | Facebook | Semi-structured interviews. Data also collected from five students on their use of a Facebook group. | Six common themes were identified: collaborative learning, strategic uses for the preparation for assessment, sharing experiences and providing support, creating and maintaining connections, personal planning and practical organization and sharing and evaluating educational resources. |
| Alkhalaf 2018136 | 160 | Whatsapp use amongst clinical undergraduate medical students | WhatsApp | Students surveyed on their use of social media services and their academic performance. Factor analysis of the self-report data of the social media addiction items was conducted. | WhatsApp use not associated with low GPA. Students use social media during lectures. Negatively associated with sleep time. |
| Alsuraihi 2016117 | 657 | Demographics, beliefs, barriers and challenges using social media for Saudi medical students. | Facebook, Twitter, YouTube, Skype | Questionnaire distributed through social media. | 40% found SoMe distracting. Clinical year students (year 5 and 6) do not think their tutors use social media effectively. SoMe facilitates communication between students. |
| Avci 2015106 | 482 | Attitudes towards social media use in medicine. | Facebook, Twitter, LinkedIn, YouTube | Cross sectional survey exploring frequency of social media use and attitudes towards social media. | Social media use was not correlated to gender or academic year. The 5 factors assessed were usefulness, popularity, ethics, barriers and personal innovativeness. |
| Banerjee 201989 | 67 | Understanding which social media platform pre-clinical undergraduate medical students felt best worked for medical education. | Facebook, Twitter, Instagram, WhatsApp, Snapchat, WeChat, LinkedIn, Pinterest, Google+, Telegram, Quora | Survey | Just under half of the students used social media for medical education matters each day. More than half felt YouTube and WhatsApp were the best applications for medical education. |
| Barlow 2015131 | 880 | Assessing unprofessional content seen on social media. | Facebook, Twitter, YouTube, Reddit, MySpace | Survey to all Australian medical students. | Students reported significantly more unprofessional content on others' accounts than their own. 97% of students had changed default security settings, and 85% had private profiles. |
| Barman 2018138 | 200 | Social network usage was compared to anxiety and depression scores | Facebook, Instagram, WhatsApp | Questionnaire study with three measures (social network use, State Trait Anxiety Inventory, Becks Depression Inventory) administered to a random sample of 40 students from each year. | Anxiety and depression scores were significantly higher among students who used social media for 4 hours or more, used it during odd hours or stated an inability to spend a day without social media than their counterparts. |
| Barry 2016121 | 73 | Use of social media among anatomy students, and to examine attitudes of social media use and lecturer interactions. | Facebook, YouTube | Survey. | 78% students found YouTube videos useful. 0% students found these videos to be of no benefit. 59% students feel comfortable approaching a lecturer in person, whilst 29% prefer sending an email. |
| Ben-Yakov 2015103 | 530 | An online survey study of Canadian emergency physicians and trainees about social media use | Facebook, Twitter, LinkedIn | Online survey disseminated via email list with 25 questions. | A minority had used Facebook to look up a patient and a predictor of doing this was perceiving this action as neutral or ethical. 63% thought looking up a patient of Facebook was unethical. |
| Bickerdike 201694 | 376 | Questionnaire assessed present student social media use habits, particularly during study time. | Facebook | Survey to assess SoMe use during study time, compared with exam scores | No association was found between use of social networks and academic performance. Facebook was the most popular social network |
| Bosslet 2011104 | 455 | Assessing experiences of online interactions between patients and healthcare workers. | Facebook, Twitter, LinkedIn, MySpace, Friendster | Random, stratified mail survey | Students less likely than physicians to report having visited the profile of and received friend requests from a patient/patient’s family member. A majority did not think it is ethically acceptable to interact with patients within SoMe.. Majority expressed concerns about maintaining patient confidentiality |
| Chester 2017129 | 54 | Patient targeted googling (including reviewing patients' social media accounts) in order to inform healthcare delivery. | Facebook, Twitter, Google+ | Online 24 item survey exploring prevalence and attitudes towards patient targeted googling, and prevalence and usage of Social Media. Further focus groups. | 17% had conducted patient targeted googling (PTG). 93% found it inappropriate to accept a friend request from a patient. Participants in the focus groups described using PTG to improve patient safety and to seek information to enhance their understanding of the patient's situation. |
| Chretien 201099 | 64 | General online habits, nature of students' postings, what would constitute inappropriate posted material, and thoughts about institutional guidelines | Facebook | Focus groups | Students disagreed as to what was inappropriate to post, experiencing online identity conflicts and described ambivalence toward Facebook. Students were concerned about online activity risks and lack of personal control. Their postings were guided by common sense and what they believed was expected from medical students. |
| Chretien 2015119 | 10 | Medical students who use Twitter for education and professional development | Twitter | Structured observation, semi-structured interviews with key informants and network analysis | Medical students on Twitter use the platform to supplement their professional and educational learning. Medical students on Twitter are well connected with one another. Medical students who use Twitter may only represent one type of learning style and/or personality. |
| Curtis 2019107 | 8 | Social media use, professional identity and professionalism concerns amongst medical students | Facebook | Focus group and semi-structured interviews. | Cease of Facebook use was associated with a sense of loss. Students did not envisage having patients as Facebook friends. Students aware of higher standards of professionalism associated with professional status. |
| El Bialy 2015109 | 135 | Medical educator and medical student use of social networking sites. | Facebook, Twitter, Instagram, LinkedIn, YouTube, Tumblr, Pinterest, Reddit, Google+ | Survey | Educators used social media for posting opinions, video sharing, chat and medical education. Students used them to chat, medical education, videos, opinions, surveys or playing games. |
| El Bialy 2017113 | 160 | Use of SoMe in medical learning | Facebook, Twitter, Instagram, LinkedIn, YouTube, Tumblr, Pinterest, Reddit, MySpace, Google+ | Survey | Types of interaction on social media were mainly answering a question, making an inquiry, posting a social event or an explanatory comment. Most students prefer sample tests/quizzes and study guides on SoMe. |
| Garner 201093 | 56 | Survey regarding professional activity on Facebook | Facebook | Online survey distributed via mailing list | Over half had reported that there were embarrassing photos of themselves on Facebook and over half also reported seeing unprofessional behaviour on Facebook. Most understood the consequences of unprofessional behaviour. |
| George 2014132 | 2109 | Understanding student attitudes to professionalism in the context of residency applications. | Facebook | Survey on professionalism using pictures from social media sites. | The majority of respondents found that ‘the pictures... should not be grounds for automatic rejection of the application’. A small number of students believed that the picture should lead to automatic rejection of the application”. |
| Golden 2012130 | 234 | Unprofessional posts on applicant's Facebook page | Facebook | Four reviewers at different levels of medical experience accessed Facebook profiles through an independent account that was not affiliated with university. Scores were assigned. | 13 profiles (11%) received were considered a professionalism violation. There was no correlation between demographic data, relationship status, USMLE Step 1 score, offer of interview or successful match and professionalism. |
| Guraya 201890 | 1312 | Medical students use of social networks for medical education purposes across three institutions. | Facebook, Twitter, Instagram, LinkedIn, Pinterest | Survey | 37% used social networking for distribution of educational content daily. Facebook was the most commonly used (52%) for this purpose. The most common content shared were lectures (38%). |
| Hartnup 2018115 | 84 | In order to develop a deeper understanding of the way medical students use social media | Facebook, Instagram, WhatsApp, Snapchat, YouTube | Interviews with 78 medical students at different medical schools were performed. Input from digital technology experts was used too in order to further describe and explain behaviours. | Drivers of engagement were: maintaining existing relationships, building new relationships & seeking academic support. Inhibiting factors were: collapsed online identity, unclear and even conflicting norms, desire to present an ideal self & perceived academic competition within social groups. |
| Hatch 2013134 | 895 | Interprofessional social media activity | Not stated. | Questionnaire-based evaluation forms, content analysis of graffiti wall and researcher observation. | There was general positive feedback from students on discussion of professionalism Some students felt that it was common sense to know what was professional on SoMe |
| Henning 2017100 | 57 | To establish the most effective approach and type of educational intervention for health professional students. | Facebook | A qualitative, multinational, multi-institutional, multi professional study using semi-structured interviews. | Three key themes from data analysis: negotiating identities, distancing and risks. Students wanted e-professionalism taught to them by authoritative figures and peers. |
| Jain 2014147 | 1421 | Simulated Facebook posts regarding issues of professionalism were shown to participants. | Facebook | Online survey with four main sections: demographic information, Facebook usage patterns, attitudes towards online professionalism and a series of 29 fabricated mock Facebook screenshots | Faculty members indicated statistically significant lower appropriateness and comfort levels compared with medical students in slightly more categories than public's appropriateness rating. Significant difference were also seen with regards to gender, age and race. |
| Javed 2015123 | 162 | Use of and attitudes towards SoMe | Facebook, Twitter, LinkedIn, YouTube, MySpace, Google+, Skype | A questionnaire was used that was developed after a comprehensive review of literature. | A majority of respondents agreed that social media plays an effective role in academic performance, recommending that social media be used for discussing issues related to health, patient care, and treatment. |
| Jha 2016105 | 452 | Study assessed pattern of usage, usage for academic purposes and health consequences of Facebook use in the population. | Facebook | Self-reported questionnaire on Facebook use | The widespread use of Facebook among the health science students, was found to have both positive and negative effects on their academics, social life, and health.' |
| Kang 2015125 | 212 | Use of social media and knowledge of General Medical Council guidance for social media use. | Facebook | Two identical questionnaires assessing social media use and knowledge on GMC guidance of social media, with GMC guidance on social media sent between surveys. | Social media use was widespread amongst medical students, but the majority were unaware of GMC guidance on this issue. Despite this, many questions were answered correctly. |
| Khamis 2018120 | 176 | Comparison between PBL based and traditional course medical student use of IT at the same university. | Facebook, Twitter, YouTube | Survey | 95.5.% of students felt that ‘IT helps them work faster’. Preferred aspects included increased learning outside of the classroom (on social media) and better availability of teaching staff. |
| Kitsis 2016135 | 1110 | Familiarity, competence, frequency of use and whether they have seen or posted unprofessional content on SoMe. | Facebook, Twitter, Instagram, LinkedIn, Pinterest, Google+ | Survey | There is a significant difference in how medical students and faculty members use social media and post/perceive unprofessional content on social media. |
| Lahiry 201991 | 359 | Social media relationship with academic performance | Facebook, Twitter, WhatsApp, LinkedIn, Reddit, MySpace, Google+, Skype | Online survey noting demographics, usage pattern on social media and perceived impact on academic studies. | 60.8% of students report a positive impact on their academic studies. 45% each of students believe social media to have a positive or negative impact on interpersonal relationships. Nearly 90% of respondents believed that social media could positively impact on academic performance. |
| Lee 2011128 | 103 | Response to medical professionalism scenarios on social networking sites | Facebook, PTT | Survey of 22 questions on social networking sites | Students who maintained personal boards on PTT scored lower on humanism. Students with high frequencies of use of Facebook and⁄or PTT scored lower on integrity. |
| Li 2015116 | 439 | Use of Digital Learning Ojectss (inc. social media), procedures learnt through DLO, rating the accuracy/importance of DLOs | YouTube | Survey | 97.5% of healthcare students use digital learning objects to aid studies. YouTube is popular for learning clinical procedures. On average students feel these online resources are useful & important. |
| Mustafa 2020114 | 411 | Pre-existing usage of YouTube among medical students | YouTube | Survey | Significant differences between year groups in demonstrators recommending YouTube. 91.2% of students used YouTube. Dissection videos were most popular. |
| Mysko 2015118 | 6 | Why students are using twitter, factors influencing engagement, educational applications of twitter by medical schools | Twitter | Semi structured interviews | Twitter has an array of practical applications in undergraduate medical education and provides extensive opportunities and benefits for students via active learning experiences Twitter can effectively foster personal and professional development |
| Nicolai 2017111 | 1597 | Use of cohort specific closed Facebook discussion groups for pre-clinical medical students | Facebook | Focus group followed by structured interviews with extensive users and non-users of the platform. Mixed methods to analyse a random group of posts within a two-semester time frame. | Students recognised the efficiency of the platform, but had difficulties keeping up to date with posts. Non-users stated they had concerns surrounding privacy, alongside time restraints. |
| O'Malley 2019108 | 139 | Use of social media for physiology learning, including prevalence, perceived benefits, favoured platforms, and reason(s) for its use | Facebook, YouTube | 25-item survey using Likert scale and free-text. | Majority of students use social media regularly for revising physiology and using this preferentially over asking the faculty/lecturer. 42% of students do not automatically trust the resources they use but only 31% would fact-check resources. |
| O'Sullivan 2017148 | 1640 | Patterns of SoMe use, limiting/encouraging factors for its use, any training received | Facebook, Twitter, YouTube, | Survey | 35% of respondents have received specific social media training. Three top barriers of SoMe use: uncertainty on policies, concerns about professionalism, lack of support from the department. Amongst users, 20.5% ‘almost always’ reported sharing clinical images without explicit permission. |
| Osman 2012101 | 82 | Assessed participants' use of Facebook and their awareness of data accessibility and privacy | Facebook | Survey measured: Facebook activity levels, privacy settings, perceptions of use and perceptions of guidelines | Guidelines are likely required for professional social media use. Senior professionals may not be best placed to produce them. |
| Patel 2012102 | 266 | Attitudes towards social media use. | Facebook, YouTube, MySpace | Cross sectional survey. | student and faculty significantly disagreed regarding whether medical students need guidance to ensure that they understand how the inappropriate use of SoME could harm their careers. |
| Ponce 201396 | 431 | Review of applicants’ Facebook profiles | Facebook | The average of four reviewers' professionalism scores was assigned to each applicant on review of their Facebook profile. This was correlated with other collected data including age, relationship status, academic performance and residency application score. | 9% of Facebook profiles were deemed unprofessional. Relationship status and residency composite scores were associated with lower professionalism scores |
| Rapp 201695 | 78 | Which online resources the participants use to study/prepare for surgical procedures. | YouTube | Survey | Most users prefer YouTube for learning surgical procedures. Medical students and surgical trainees are more likely to use YouTube (vs other sources) than senior surgeons. |
| Reveron 201692 | 120 | Use of YouTube study medicine. | YouTube | Survey | 85% used YouTube as an online information resource to study human anatomy (average 1.88 hours per day). |
| Rocha 201498 | 350 | Frequency and repercussions for unprofessional behaviour | Facebook | Cross sectional survey | Unprofessional behaviour online is very common (with consequences). Violation of patient confidentiality was very common. Use of foul language, alcohol and wearing bathing suits common. Certain behaviours draw more rejection from peers than others. |
| Sarbaz 2019127 | 480 | Different types of social networks for different learning activities | Instagram, WhatsApp, Snapchat, YouTube, Telegram, Flickr, Vin, Tagged | Survey asking about usage, purpose and perceived impact on education. | The majority of students claim that the SoMe use negatively impact their academic performance. |
| Shenouda 2018110 | 14 | Patterns of smartphone use amongst final year medical students and FY1 doctors, relating to clinical practice. | WhatsApp | Interviews and focus groups. | SoMe generally beneficial and assets to their clinical practice. Usage different between the two groups: students used phones as learning adjuncts, whereas FY1s used phones as tools within clinical practice. |
| Strausburg 201397 | 183 | Survey regarding social media profile activity ahead of resident matching | Facebook, Twitter, Instagram, LinkedIn, Pinterest, MySpace, Google+, Friendster | Survey. | >50% respondents altered or planned to alter their social media profile prior to residency applications. Most students beloved residence program directors would use social media to screen applicants although 38.8% thought this was unethical. |
| Tirukkovalluri 2020139 | 911 | Study of social media isolation in healthcare students | Facebook, Twitter, Instagram, WhatsApp, YouTube, Intercept | Perceived Social Isolation was assessed by using Patient-Reported Outcomes Measurement Information System (PROMIS) | Younger students (17-21) had higher perceived social media isolation. Isolation more common among females. High WhatsApp usage associated with more isolation. |
| White 2013133 | 696 | Appropriate behaviour of healthcare professional students on Facebook. | Facebook | Mixed methods: semi-structured interviews to identify themes which were explored through survey. | Different types of material posted on Facebook were considered unprofessional by different students. Many observed unprofessional behaviour or partook in it in the past. Some students disliked faculty involvement but the majority believed guidelines would be beneficial. |
| Zanon 2018124 | 4244 | Analysing how users interacted with a Facebook group which uploads radiology focussed cases | Facebook | Facebook analytics  Survey. | The most common imaging modalities posted were X-rays, followed by CT scans. 35 posts were made. The survey showed neuroradiology was the most commonly requested topic. |