

Social networking sites and the experience of older adult users: A systematic review

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Declaration of contribution of authors

L. Newman and A. Spector conceived and designed the study. L. Newman analysed and interpreted the data and drafted the article. L. Newman, C. Stoner and A. Spector contributed to the revision of the article for important intellectual content. All authors approved the version of this article to be published.

ABSTRACT

This study aimed to systematically review the use of Social Networking Sites (SNSs) from an older adult perspective (all papers had average sample age of 65+, and samples ranged in age from 50 – 98). Characteristics of older adult SNS users, incentives and disincentives for use and the relationship between SNS use, wellbeing and cognitive function were explored. From a systematic search, 21 papers met inclusion criteria and were subjected to a quality review. Paper quality was often low or medium, as rated by a standard quality assessment framework. Results indicated that older adult SNS users were more likely to have particular characteristics including being female and younger. The main incentive for use was to maintain contact with family and friends. Disincentives included privacy concerns and lack of perceived usefulness. The relationship between SNS use, wellbeing and cognitive function was inconclusive. SNS use is a multidimensional phenomenon that needs to be understood in the context of broader communication practices, individuals' social relationships and individual preferences and characteristics.

KEY WORDS: Social Media, Social Networking Sites, Older Adults, Ageing, Technology, Systematic Review.

Introduction

Social relationships, wellbeing and health

Social relationships are important for health and mortality in later life (Holt-Lunstad *et al.* 2015; Valtorta *et al.* 2016). Despite popular conceptions of older age as a universal period of heightened loneliness, growing older has divergent consequences for social connectedness (Cornwell, Laumann and Schumm 2008). Only a minority (5-15%) of older adults report 'frequent' loneliness, with an additional 20-40 percent reporting 'occasional' loneliness. However, for adults aged 80+, loneliness is more common with around 40-50 percent reporting feeling 'often' lonely (Dykstra 2009; Pinquart and Sorensen 2001). Furthermore, physical morbidity and bereavement are associated with an increased risk of loneliness and social isolation (Victor *et al.* 2005).

Social Networking Sites (SNSs)

Social Networking Sites (SNSs) are (1) built on Web 2.0; (2) underpinned by user-generated content; (3) facilitate the development of online connections to other individuals and/or groups; and (4) users create profiles designed and maintained by the site (Obar and Wildman, 2015). Nevertheless, defining SNSs can be challenging because of the rapidly evolving nature of technology and blurred boundaries between SNS and other communication platforms (e.g. *WhatsApp* is similar to an SNS and a text messaging service). Examples of SNSs include *Facebook, Twitter, Instagram, LinkedIn, Snapchat, Tumblr, Quora* and *WhatsApp*. SNSs are now being widely adopted by older adults: in 2016, 30 percent of adults aged 65+ had an SNS account in the United Kingdom, an increase from 11 percent in 2010 (OfCom, United Kingdom communications regulator; 2016). Most research on SNSs to date has focused on adolescent and younger adult populations (e.g. Deters and Mehl 2013). However, cohort effects and the divergent quality of challenges and social relationships in younger and later life warrant a

distinct examination of SNS use from an older adult perspective (Carstensen 2006). For older adults, SNS may play a role in strengthening social connectedness (Campos *et al.* 2016), and may have benefits for cognitive function (Myhre, Mehl and Glisky 2016; Quinn 2017).

Existing reviews of Social Networking Sites and older adults

To date, three reviews have been conducted in which SNS use was examined from an older adult perspective (Coto *et al.* 2017; Leist 2013; Nef *et al.* 2013), alongside broader reviews of technology use (Campos *et al.* 2016; Coelho, Rito and Duarte 2017). The rationale for an updated review was as follows. First, the fast-changing pace of the Web 2.0 and SNSs necessitates regular updates of the field. Second, Nef *et al.* (2013) included samples of adults aged 55+, and Coto *et al.* (2017) and Leist (2013) did not specify a lower age limit. Third, the current review attempts to improve upon the methodology used by former reviews. Fourth, given differences between SNSs and other communication media e.g. email, a review of SNS use (as opposed to technology use) may help to identify unique qualities and outcomes of this medium.

Adults aged 65+ typically face different circumstances to adults in their fifties and early sixties, e.g. they are less likely to be in employment, and to have dependent children as well as their own parents. As such, only papers that included samples with an average age of 65+ were included in the current review.

This methodology improves on previous reviews via the use of a more comprehensive search strategy, by incorporating a quality assessment of papers and by outlining specific questions to be answered by the review. It retains the format of a ‘scoping review’, which aims to map the size and content of a research area (Arksey and O'Malley 2005). This format was selected because they are a useful way of exploring a new and emerging field as well as future

directions for research, and are appropriate for exploring broad topics where a wide range of study designs are applicable (Arksey and O'Malley 2005; University of York 2009).

Current review

The aim of the review was to identify, characterise and summarise existing research on SNS use from an older adult perspective. Research questions were as follows:

- What are the characteristics of older adult SNS users?
- Why do older adults use or not use SNSs?
- What is the association between SNS use and older adults' wellbeing?
- What is the association between SNS use and cognitive function?

Methodology

Search strategy

A systematic search of the following databases was performed: PsychINFO, Web of Science Core Collection, SCOPUS, International Bibliography of the Social Sciences (IBSS), Psychology Database and Medline. Databases were searched from 2004 to July 2017 (*Facebook*, the most popular SNS amongst older adults was founded in 2004) using the following terms: "Older adults" or "Older people" or "Older persons" or "Old people" or "Old age" or "Older age" or "Late life" or "Later life" or "Aging", "Ageing" or "Elderly" or "Elderlies" or "Seniors" or "Senior citizens" or "Active older Internet users" or "Over 65" and "Social media" or "Social networking" or "Social network site" or "Social network sites" or "Social network use" or "Social networks use" or "Social platform" or "Online network" or "Online networks" or "Online networking" or "Online social networks" or "Facebook". English language restrictions were applied. Both published and unpublished literature was

included in order to be as comprehensive as possible in identifying primary research studies. Some of the inclusion/exclusion criteria were developed as papers were reviewed, in line with the iterative process of a scoping review (Arksey and O'Malley 2005).

Inclusion criteria

- Original research paper on SNS use and older adults.
- Papers examining the specific use of SNSs.
- Papers from a social sciences and psychology perspective.
- Papers where the average age of the sample was 65+.

Exclusion criteria

- Papers exploring general Information Communication Technology, technology or Internet use.
- Papers focusing primarily on the computer science aspects of SNSs (e.g. programming or technological).
- Papers focusing primarily on the development and feasibility of new technology to support access to SNSs.
- Papers focusing primarily on the marketing, business and advertising aspects of SNSs.
- Focus of the paper is on dating websites.
- Focus of the paper is 'online communities'.
- Focus of the paper is on SNSs from the perspective of health conditions associated with older age e.g. Aphasia.
- Review papers.
- Dissertations.
- Published version is available (for unpublished literature).

If papers explored general Internet use and SNS use independently they were included, but only results pertaining to specific SNS use are considered here. 'Online communities' bear many similarities to SNSs however they were excluded because they were regarded to constitute a general *use or gratification* of the Internet (which may use SNSs as a platform, but which also use other online media including blogs, forums and interactive sites as their host), rather than an example of SNSs per se. Furthermore, online communities allow the user to access forums and message boards without creating a profile or an online social network (Nimrod, 2013).

Quality Review

The shortlisted papers were subjected to a quality review using the Standard Quality Assessment Criteria (Kmet, Lee and Cook 2004), developed to assess the quality of primary research papers using a variety of research designs. The guidelines consider a wide range of criteria pertaining to study quality (see Table 1 and Table 2). A summary score was computed to indicate the overall quality of the study. Where mixed methods are used, summary scores are reported for the quantitative and qualitative sections of the study. As no qualitative description of scores is provided by Kmet, Lee and Cook (2004), the following labels were used for the purposes of this review, approximately corresponding to liberal and conservative cut-offs for scores used by Kmet, Lee and Cook (2004): ≤ 0.55 = low; > 0.55 medium; $\Rightarrow 0.75$ = high. Ten percent of the papers ($n = 3$) were rated by another author to assess inter-rater reliability, and an Intra-Class Correlation (ICC) coefficient was calculated on *total* scores to ascertain level of agreement.

Table 1. *Quality criteria for quantitative studies (Kmet, Lee and Cook 2004).*

Quality criteria	
1	Question/objective sufficiently described?
2	Study design evident and appropriate?
3	Method of subject/comparison group selection <i>or</i> source of information/input variables described and appropriate?
4	Subject (and comparison group, if applicable) characteristics sufficiently described?
5	If interventional and random allocation was possible, was it reported?
6	If interventional and blinding of investigators was possible, is it reported?
7	If interventional and blinding of subjects was possible, was it reported?
8	Outcome and (if applicable) exposure measure(s) well defined and robust to measurement/misclassification bias? Means of assessment reported?
9	Sample size appropriate?
10	Analytic methods described/justified and appropriate?
11	Some estimate of variance is reported for the main results?
12	Controlled for confounding?
13	Results reported in sufficient detail?
14	Conclusions supported by the results?

Note. Items are given a score of 2 (yes), 1 (partial), 0 (no), or not applicable. Total quality rating is awarded based on sum of possible scores.

Table 2. *Quality criteria for qualitative studies (Kmet, Lee and Cook 2004).*

Quality criteria	
1	Question/objective sufficiently described?
2	Study design evident and appropriate?
3	Context for the study clear?
4	Connection to a theoretical framework/wider body of knowledge?
5	Sampling strategy described, relevant and justified?
6	Data collection methods clearly described and systematic?
7	Data analysis clearly described and systematic?
8	Use of verification procedure(s) to establish credibility?
9	Conclusions supported by the results?
10	Reflexivity of the account?

Note. Items are given a score of 2 (yes), 1 (partial), 0 (no), or not applicable. Total quality rating is awarded based on sum of possible scores.

Results

Shortlisting

A total of 1164 papers, excluding duplicates, were identified from the database search. Sixty-three items (conference titles) were incorrectly identified as research papers and were excluded. Titles were subsequently reviewed for relevance, resulting in 252 shortlisted papers for which the abstract was subsequently screened. This resulted in 48 papers for which the full text was reviewed. Thirty papers were excluded at this stage, with the most common reason for exclusion being the average age of the sample (< 65). A further three papers were identified via hand-search, producing a final shortlist of 21 papers (12 peer-reviewed papers and nine

conference papers). Reference lists of shortlisted papers and past reviews were also searched, but no additional papers were identified in this way (see Figure 1).

Overview of papers

Table 3 (peer-reviewed) and Table 4 (conference papers) provide an overview of the literature. Significant homogeneity existed in the literature in terms of country of origin (USA and Europe) and SNSs studied (Facebook). Participants ranged in age from 51 to 98 and mean sample age ranged from 65.3 (Yu, McCammon *et al.* 2016) to 78.7 (Myhre *et al.* 2016). Females were more represented than males in the majority of studies (on average representing 56.8% of the sample).

The majority of studies used correlational or descriptive methods, and two used an experimental design (Myhre *et al.* 2016; Quinn 2017). Of the descriptive and correlational studies, one study used a longitudinal design (van Ingen, Rains and Wright 2017). Six studies employed qualitative methods (Ballantyne *et al.* 2010; Erickson 2011; Hope, Schwaba and Piper 2014 ; Jung *et al.* 2017; Matilainen, Schwartz and Zeleznikow 2017; Quinn, Smith-Ray and Boulter 2016) and one study used mixed methods (Lüders and Brandtzaeg 2014).

Regarding inter-rater reliability, the ICC for ten percent of the papers ($n = 3$) (single measure, two-way mixed effects, absolute agreement) was 0.88.

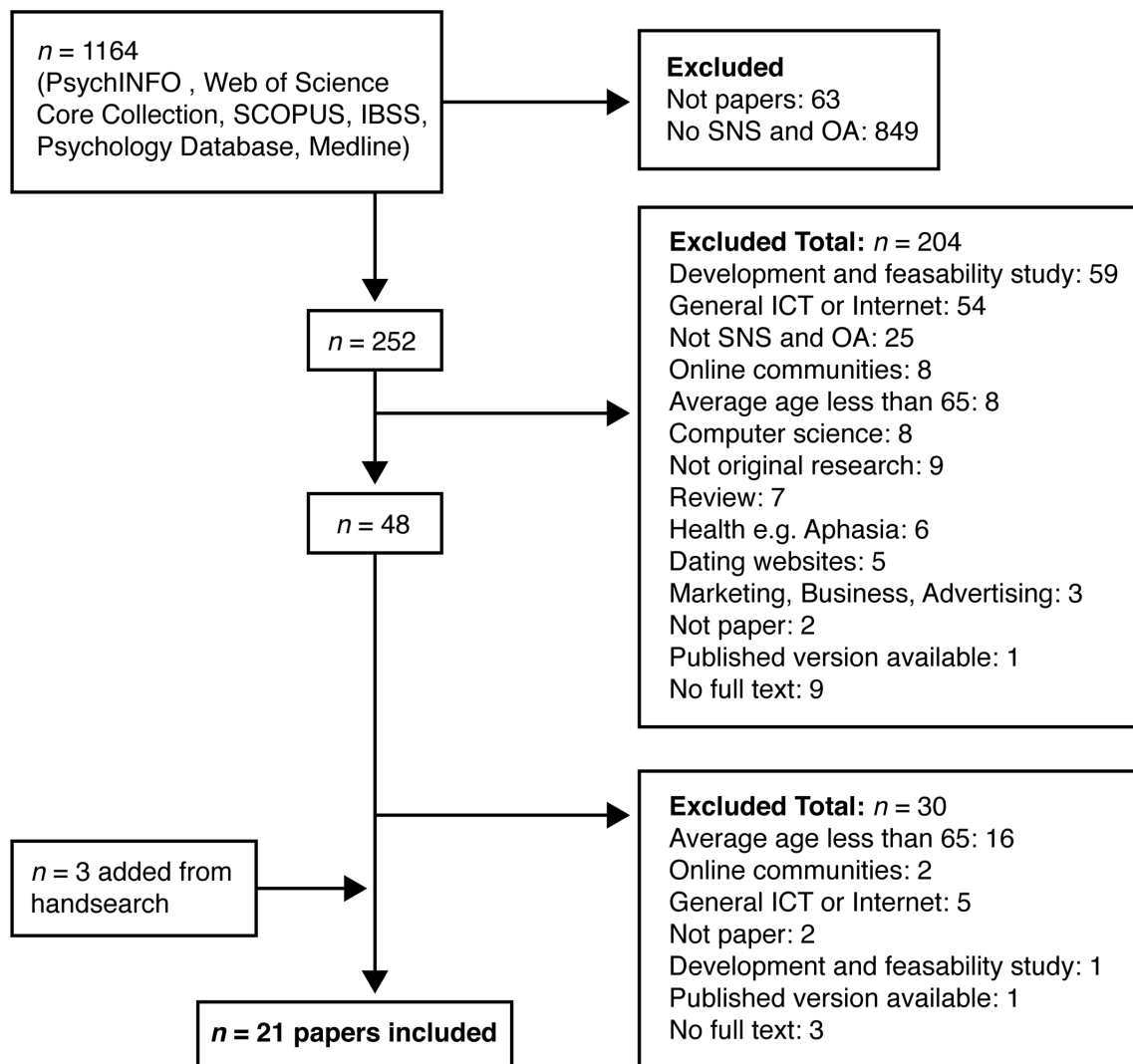


Figure 1. Shortlisting process for systematic review.

Notes: IBSS: International Bibliography of the Social Sciences. SNS: social networking site. OA: Older Adults. ICT: information and communications technology.

Table 3. Summary of included studies (peer-reviewed).

Author	Design	SNS site	n	Age	% Female	Country	Main finding	Quality review score	Results section No.*
Aarts <i>et al.</i> (2014)	Correlational, cross-sectional	Any SNS	626	60+ (mean 66.94)	50.5%	Netherlands	No simple association between SNS use (frequency) and loneliness or mental health in community-dwelling older adults.	0.86	3
Ballantyne <i>et al.</i> (2010)	Qualitative, semi-structured interviews (intervention)	Their own	6	69-85	25% ^a	Australia	Participants from a community aged care programme reported beneficial effects of participating in an SNS intervention, clustered around four themes: reduction in feelings of loneliness; perceiving technology as an enabler; importance of one-on-one teaching for successful participation; increased feelings of connectivity to the outside world.	0.45	3
Braun <i>et al.</i> (2013)	Correlational, cross-sectional	<i>Facebook</i> , <i>Twitter</i> , <i>MySpace</i>	124	60-90 (mean 70)	71%	USA	Perceived usefulness, trust in SNSs and frequency of Internet use were predictors of intention to use SNSs. Perceived ease of use of websites, social pressure from family and age not predictors of intention to use SNSs.	0.77	2
Hutto <i>et al.</i> (2015)	Descriptive/ Correlational, cross-sectional	<i>Facebook</i>	141	Mean 71.7	67.4%	USA	<i>Facebook</i> users were younger, had greater confidence in technology, more favourable attitudes to SNSs, and had higher social role satisfaction than non-users. No difference in loneliness between <i>Facebook</i> users and non-users. Group who engaged in higher levels of particular activity on <i>Facebook</i> (directed communication or passive consumption) reported less loneliness than those reporting low levels of these activities. Higher levels of directed communication correlated with higher social role satisfaction. Reasons for non-use of <i>Facebook</i> were lack of access, privacy/security concerns, lack of interest, and perception that too complicated.	0.73	1, 2, 3

Table 3. (continued)

Author	Design	SNS site	n	Age	% Female	Country	Main finding	Quality review score	Results section No.*
Jung and Sundar (2016)	Descriptive/ Correlational, cross-sectional	Facebook	352	60-86 (mean 67.74)	52.3%	USA	Participants used <i>Facebook</i> for following reasons: social bonding, social bridging, curiosity, and responding to family member requests. Motivations for using <i>Facebook</i> not discretely linked to particular <i>Facebook</i> activities, although some patterns indicated.	0.60	2
Jung <i>et al.</i> (2017)	Qualitative, semi-structured interviews	Facebook	46	Mean 80.4	63%	USA	Participants used <i>Facebook</i> for following reasons: keeping in touch, sharing photos, social surveillance, responding to family member requests, convenient communication, curiosity. Non-users did not use <i>Facebook</i> for following reasons: privacy concerns, need for media richness, preference for familiarity, perceived triviality of communication, time commitment required by <i>Facebook</i> , frustration with site tools.	0.75	2
Kim and Kim (2014)	Correlational, cross-sectional	Any SNS	213	60+ (mean users 66.71; mean non-users 66.56)	41.8% (users); 58.2% (non-users)	USA	Significant difference in measure of general cognitive function for SNS and non-SNS users.	0.45	4
Lüders and Brandtzaeg (2014)	Correlational, cross-sectional and qualitative, focus groups (mixed methods)	Any SNS	290/39 ^b	53+ (mean 73/75)	57%	Norway	Perceived usefulness/privacy protection increased intention to use SNSs. Perceived ease of SNS use decreased intention to use SNSs. Main reasons for not using SNSs were: seeing SNSs as cold and narcissistic form of communication and detracting from relationships with strong ties; privacy and information security concerns; lack of competence. Main motivation for becoming SNS user was to increase contact with family and close ties.	0.65/ 0.65	2

Table 3. (continued)

Author	Design	SNS site	<i>n</i>	Age	% Female	Country	Main finding	Quality review score	Results section No.*
Myhre <i>et al.</i> (2016)	Experimental (pre/post with comparative treatment group and waitlist control)	Facebook	41	Mean 81.75/75.71	70.7%	USA	Improvement in an aspect of executive function (updating) following a Facebook intervention in older adults living in retirement communities. No improvement in other cognitive measures or social wellbeing.	0.69	3, 4
van Ingen, Rains and Wright (2017)	Correlational, longitudinal	Any SNS	2032 (subjective wellbeing); 2,162 (social loneliness)	Mean 66.81	Gender not reported	Netherlands	Evidence that time spent on SNSs buffers the impact of functional disability on subjective wellbeing, and to lesser extent social loneliness (not emotional loneliness). Time spent on online shopping also buffered impact of functional disability on subjective wellbeing.	0.86	3
Yu, McCammon <i>et al.</i> (2016)	Correlational, cross-sectional	Any SNS	607	52-98 (mean 65.27)	51.5%	USA	In a nationally representative sample of older adults, SNS use (use vs. non-use) predicted: perceived social support from children, but for 'younger' older adults only; perceived social support from non-kin; feelings of connectedness (to greater extent for 'older' older adults). SNS use did not predict perceived social support from immediate family or feelings of isolation.	0.77	3
Yu, Ellison <i>et al.</i> (2016)	Correlational, cross-sectional	Any SNS	869 ^c	52-103 (mean 65.72)	54%	USA	In a nationally representative sample of older adults, diversity of online activities, younger age, and female gender increased likelihood of being SNS user. Moderating effect of age (<60 vs. 60+) on ethnicity, marital and employment status on odds of using SNSs. No association between economic resources, health resources and SNS use.	0.95	1

*1 = What are the characteristics of older adult SNS users? 2 = Why do older adults use or not use SNSs? 3 = What is the association between SNS use and older adults' wellbeing? 4 = What is the association between SNS use and cognitive function?

^a Of those who completed intervention. ^b 290 (survey); 39 (focus groups). ^c *n* in SNS study (from larger sample of Internet users).

Table 4. Summary of included studies (unpublished conference papers)

Author	Design	SNS site	n	Age	% Female	Country	Main finding	Quality review score	Results section No*
Bell <i>et al.</i> (2013)	Descriptive/ Correlational, cross-sectional	Facebook	142	50+ (mean 72)	66.9%	USA	Facebook users younger and more likely to be female than non-users. Most connections in participants' networks were family and friends; only minority used Facebook to meet new people. Facebook users higher social role satisfaction and confidence with technology than non-users. No significant difference in loneliness between Facebook users and non-users.	0.65	1, 2, 3
Erickson (2011)	Qualitative, semi-structured interviews	Facebook	7	65-72	71.4%	USA	Facebook allowed participants to have an awareness of family and friends' lives; Facebook used for 'light' (not personal) conversation; most connections were family and close friends. Perceived negative aspects of Facebook use were: seeing content as vulgar, inappropriate; privacy concerns. Overall, Facebook not seen as particularly important part of participants' lives.	0.5	2
Hope <i>et al.</i> (2014)	Qualitative, semi-structured interviews	Any SNS	22	71-92 (mean 80.9)	68.2%	USA	Minority of participants used SNSs, and they used it for posting messages, connecting with younger family, 'lurking', playing games and 'following' people of interest. Participants preferred to communicate with traditional communication media. Reasons for non-use included lack of interest, perceiving it as non-meaningful way to spend time, privacy concerns, seeing content as unimportant and trivial, perceiving SNSs to be for younger people, seeing it as inappropriate arena to discuss personal views, lack of credibility of information and news, perception that it requires 'constant communication' not wanting to engage in reciprocity with weak ties (when they would rather engage in exchanges with closer ties).	0.57	2

Table 4. (continued)

Author	Design	SNS site	n	Age	% Female	Country	Main finding	Quality review score	Results section No*
Matilainen <i>et al.</i> (2016)	Qualitative, semi-structured interviews (intervention)	<i>Facebook</i>	6	69-88	Gender not reported	Australia	Intervention was acceptable to participants and preliminary results suggest participants found it beneficial. No conclusions could be drawn about impact on social connectedness due to unforeseen developments in the intervention setting.	0.38	3
Quinn (2016)	Qualitative, focus group	<i>Facebook, Twitter, LinkedIn</i>	16	65-72	56.3%	USA	SNSs perceived as helpful in overcoming reduced mobility, staying connected with family, staying connected with technologies used by younger generations, maintaining cognitive stimulation. Also perceived as time wasting, trivial and unnecessary. Participants spoke about physical and cognitive barriers to using SNSs.	0.6	2
Quinn (2017)	Experimental (pre/post with waitlist control)	<i>Facebook, Twitter</i>	36	65+ (mean 76.8)	69.4%	USA	Improvement in aspect of executive function (inhibition) at 4 weeks/4 months and processing speed at 4 weeks following SNS intervention. No improvement on overall measure of cognition, attention, working memory.	0.54	4
Richter <i>et al.</i> (2013)	Correlational, cross-sectional	Any SNS	3126	68.6 (online group); 74.9 (offline)	38.9% (online); 62.7% (offline)	Germany, Netherlands, Switzerland	SNS users younger, less educated and lived less frequently in city/suburb, more socially included (more likely to meet with friends weekly or be engaged in pro-social activities). No difference between SNS users and non-users in likelihood of having a partner or someone to talk to, or in mental health.	0.64	1, 3
Rylands and van Belle (2017)	Descriptive/ Correlational, cross-sectional	<i>Facebook</i>	59	60+ (mean 65.9)	64%	South Africa	Most participants used <i>Facebook</i> to stay connected with friends and family, not to form new relationships. Participants used a limited set of <i>Facebook</i> features. Association found between <i>Facebook</i> functionality (i.e. more functions used) and the extent to which participants perceived Facebook to have a beneficial impact on their Quality of Life. Obstacles to using <i>Facebook</i> included false and unwanted advertising and complicated privacy and security settings.	0.50	2, 3
Sundar <i>et al.</i> (2011)	Descriptive/ Correlational, cross-sectional	<i>Facebook</i>	168	55+ (mean 69)	33%	USA	Primary motivation for using <i>Facebook</i> was request from family/friends. Non-users lacked interest in joining. No association between <i>Facebook</i> use (use vs. non-use; frequency use; <i>Facebook Intensity Scale</i>) and Quality of Life.	0.50	2, 3

*1 = What are the characteristics of older adult SNS users? 2 = Why do older adults use or not use SNSs? 3 = What is the association between SNS use and older adults' wellbeing? 4 = What is the association between SNS use and cognitive function?

What are the characteristics of older adult SNS users?

Four studies examined characteristics of older adult SNS users (Bell et al. 2013; Hutto et al. 2015; Richter et al. 2013; Yu, Ellison, et al. 2016). Older adults SNS users were more commonly female (Bell et al. 2013; Yu, Ellison, et al. 2016) and younger (early to mid-sixties), compared to their non-SNS user counterparts (Bell et al. 2013; Hutto et al. 2015; Yu, Ellison, et al. 2016) While one study found that SNS users had fewer years of education than non-users (Richter et al. 2013), another study found no association between education, income and SNS use (Yu, Ellison, et al. 2016). According to Yu, Ellison, et al. (2016), SNS users aged 60+ were more likely to be white, employed, and married (N.B. mean age of the sample is 65+ however only findings for <60 years of age and >60 years of age were reported). Cognitive functioning and self-rated health was not associated with SNS use (Yu, Ellison, et al. 2016). Bell et al. (2013) found no association between SNS use and ethnicity or income, however their sample was highly homogenous in terms of ethnicity (90.8% white), thereby weakening this finding. SNS users were more confident with technology (Bell et al. 2013; Hutto et al. 2015; Richter et al. 2013), used the Internet more (Richter et al. 2013; Yu, Ellison, et al. 2016), and perceived more positive consequences to using the Internet (Richter et al. 2013) and SNSs (Hutto et al. 2015).

This research suggests that differences in attitudes towards technology and some sociodemographic measures (particularly gender and age) currently exist between SNS older adult users and non-users. However, the small number of studies and limitations in sampling method mean that these findings should be regarded with caution. Nevertheless, the quality of studies was either medium ($n = 3$) or high ($n = 1$), lending some strength to these findings.

Why do older adults use or not use SNSs?

Eleven studies included content relevant to incentives and disincentives for using SNSs. Most papers were medium quality (n = 6), with the remaining rated as low (n = 3) or high quality (n = 2). A common limitation was the use of convenience samples, meaning that findings may not be representative of the wider population. Samples were often highly educated making it unclear to what extent findings generalise to individuals with fewer years of education. Furthermore, qualitative papers were limited by a lack of link to theory, inadequate description of data analysis, lack of verification procedures and lack of reflexivity in the account.

A primary motivation for using SNSs amongst older adults is to maintain close ties e.g. family and friends (Erickson 2011; Hope, Schwaba and Piper 2014; Jung and Sundar 2016; Jung *et al.* 2017; Quinn, Smith-Ray and Boulter 2016; Rylands and Van Belle 2017; Sundar *et al.* 2011). Perceived benefits of joining SNSs included a means of staying connected to younger generations (Hope, Schwaba and Piper 2014; Quinn, Smith-Ray and Boulter 2016), a means of remaining cognitively active (Quinn, Smith-Ray and Boulter 2016), curiosity about others' lives (Jung and Sundar 2016; Jung *et al.* 2017), playing games, and keeping up to date with persons of interest (Hope, Schwaba and Piper 2014). Although some papers identified strengthening or maintaining relationships with 'weaker ties' e.g. casual friends or acquaintances (Jung *et al.* 2017; Jung and Sundar 2016;), in general this was not a common reason for using SNSs. Very few participants were interested in using *Facebook* to meet new people (Bell *et al.* 2013; Erickson 2011; Rylands and Van Belle 2017).

Findings suggested that non-users perceived SNSs to be unimportant for their needs, with common reasons being a lack of interest or perceived relevance or seeing it as a non-meaningful way to spend time (Braun 2013; Hope, Schwaba and Piper 2014; Hutto *et al.* 2015; Jung *et al.* 2017; Lüders and Brandtzaeg 2014; Quinn, Smith-Ray and Boulter 2016; Sundar *et al.* 2011). SNS was perceived as a forum for superficial conversation or information, rather

than one for personal conversations or emotional support (Erickson 2011). Some participants said that SNSs detracted from their primary interest in nurturing close relationships, since they saw it as a forum for non-meaningful interactions with ‘weaker ties’ (Hope, Schwaba and Piper 2014; Lüders and Brandtzaeg 2014). Qualitative interviews suggested that some non-users disliked the communication or content on SNSs (Hope, Schwaba and Piper 2014 ; Jung *et al.* 2017; Lüders and Brandtzaeg 2014; Quinn, Smith-Ray and Boulter 2016; Rylands and Van Belle 2017), which was described as trivial, unimportant, self-centred and unreliable.

Other factors which deterred use were a lack of familiarity with SNSs (Jung *et al.* 2017) and lack of access (Hutto *et al.* 2015; Sundar *et al.* 2011). Although a perceived lack of competence in utilising SNSs was cited as a reason for non-use (Jung *et al.* 2017; Lüders and Brandtzaeg 2014; Quinn, Smith-Ray and Boulter 2016; Sundar *et al.* 2011), in general this did not appear to be a major obstacle (Braun 2013; Lüders and Brandtzaeg 2014; Hope, Schwaba and Piper 2014). Privacy concerns (both regarding losing control over information shared online and social privacy) were identified as a deterrent to SNS use (Hope, Schwaba and Piper 2014 ; Hutto *et al.* 2015; Jung *et al.* 2017; Lüders and Brandtzaeg 2014; Sundar *et al.* 2011). It was unclear whether these concerns extended to general Internet use or were specific to SNSs.

Together, these papers suggest that SNSs are used by older adults to maintain connections to people they are already close to rather than being used as a vehicle to form new ties. SNS use for the purpose of maintaining and strengthening ‘weaker ties’ (e.g. casual friends and acquaintances) was present to a lesser degree among participants. Privacy concerns and lack of perceived usefulness were common deterrents to SNS use. However, paper quality was most often low or medium, limiting the strength of these conclusions.

What is the association between SNS use and older adults' wellbeing?

The relationship between SNS use and wellbeing was considered in 11 studies, the majority of which examined social wellbeing (aspects of social relationships that have relevance to psychological wellbeing). However, other indices of wellbeing, e.g. mental health and Quality of Life were also considered in a small number of studies.

Most studies were low ($n = 4$) or medium quality ($n = 4$), with three rated as high quality. A common limitation across studies was the use of cross-sectional data, preventing conclusions about the direction of any relationship between SNS use and wellbeing (Aarts, Peek and Wouters 2014; Bell *et al.* 2013; Hutto *et al.* 2015; Richter *et al.* 2013; Rylands and Van Belle 2017; Sundar *et al.* 2011; Yu, McCammon, *et al.* 2016). Many studies used samples characterised by higher levels of social wellbeing (Bell *et al.* 2013; Hutto *et al.* 2015; Sundar *et al.* 2011), making it difficult to know how SNS use might impact on social wellbeing in individuals with high levels of social isolation and loneliness. Most studies used simple measures of SNS use (use versus non-use; frequency of use), making it difficult to discern how different types of SNS use might relate to wellbeing (Aarts, Peek and Wouters 2014; Bell *et al.* 2013; Richter *et al.* 2013; Sundar *et al.* 2011; van Ingen, Rains and Wright 2017; Yu, McCammon, *et al.* 2016). Only one study controlled for offline interactions (Yu, McCammon, *et al.* 2016) and only one study controlled for general Internet use (van Ingen, Rains and Wright 2017), meaning that in most studies it was not possible to exclude these as confounding variables.

Evidence for the relationship between SNS use and loneliness was mixed, with two studies finding no evidence for a simple association between SNS use and loneliness (Aarts, Peek and Wouters 2014; Bell *et al.* 2013), and one study with an experimental design finding no change in loneliness following an SNS intervention (Myhre *et al.* 2016). A qualitative study indicated that participants felt less lonely following an SNS intervention (Ballantyne *et al.*

2010) and one study suggested that SNS use reduced the impact of functional disability on 'social' loneliness (frequency of social contact) (van Ingen, Rains and Wright 2017). One study found that, compared to non-users, SNS users were higher in 'feelings of connectedness', although not 'isolation' (Yu, McCammon, *et al.* 2016). Hutto *et al.* (2015) found that SNS users who engaged in higher levels of particular activities on SNSs reported less loneliness, suggesting higher intensity of SNS use may be related to social wellbeing.

Yu, McCammon, *et al.* (2016) found evidence to suggest that SNS use was related to higher levels of perceived social support from children (for participants aged < 60), and friends (all ages). Myhre *et al.* (2016) found no change in perceived social support following their intervention. Richter *et al.* (2013) found that SNS users were more socially engaged than non-SNS users, however there were no differences between SNS users and non-users in social isolation. Scores on 'social satisfaction' (degree of satisfaction with social roles and activities) were higher amongst SNS users, particularly for those engaging in active communication on SNS (Bell *et al.* 2013; Hutto *et al.* 2015).

No difference was found between SNS users and non-users on a measure of mental health problems (Aarts, Peek and Wouters 2014; Richter *et al.* 2013). There was the suggestion that greater time spent on SNSs attenuated the effect of functional disability on state and trait wellbeing (van Ingen, Rains and Wright, 2017). However, the same relationship was observed for online shopping, suggesting this effect was not specific to SNS use. Sundar *et al.* (2011) found no relationship between SNS use and Quality of Life. Many participants in one study indicated that *Facebook* use allowed them to be more socially and intellectually engaged, particularly participants using functions on the site to a greater extent. This may suggest that participants more active on SNSs reaped greater rewards for wellbeing (Rylands and Van Belle, 2017). However, they adapted an existing Quality of Life measure without testing its psychometric properties, thereby weakening their findings.

Owing to the fact that most papers were of low or medium quality, these findings suggest that the relationship between SNS use and wellbeing amongst older adults is currently inconclusive. The major limitations that restrict firmer conclusions include the preponderance of cross-sectional data, limitations regarding measurement and difficulty in controlling for extraneous or confounding variables e.g. offline social interaction.

What is the association between SNS use and cognitive function?

Three studies examined the relationship between SNS use and cognitive function (Kim and Kim 2014; Myhre *et al.* 2016; Quinn 2017), all of which were low ($n = 2$) or medium quality ($n = 1$). All studies were limited by their use of convenience samples and small sample size.

One study found a significant difference between cognitive function for SNS users and non-users, however their analysis was flawed by lack of control for confounding variables (e.g. general Internet use, education) and use of an inappropriate test i.e. they purport to use a *t-test* to examine relationships (Kim and Kim 2014). The two remaining studies used an experimental design, with both studies finding beneficial effects of an SNS intervention on aspects of executive function, although the effect disappeared at follow-up in one study (Quinn 2017). The use of a treatment control group (a ‘non-social’ online intervention) did not demonstrate a similarly beneficial effect in one study (Myhre *et al.* 2016). The remaining experimental study only used a waitlist control group (Quinn 2017).

The evidence for the relationship between SNS use and cognitive function based on this very small number of studies was therefore mixed. There was some preliminary indication that learning how to use an SNS site had benefits for an aspect of executive function. However, owing to limitations in methodology, these findings should be interpreted with caution.

Discussion

Summary of findings

SNS users were more likely to be younger (early to mid-sixties), female and to have more favourable attitudes towards using the Internet. These findings suggest that it is important to consider sociodemographic characteristics and technological attitudes of older adults when examining the uptake and impact of SNSs on this population (e.g. by controlling for these characteristics in analyses). Nevertheless, the small number of studies and limitations in sampling method preclude strong conclusions. It remains to be seen to what extent any differences between older adult SNS users and non-users reflect a cohort effect or developmental effect i.e. a shift in attitudes and preferences as individuals age.

Overall, results suggested that older adults mainly use SNSs to keep in touch with close family and friends. Using SNSs to strengthen or form new connections appeared to be less important. Concerns about privacy were a common reason for non-use of SNS, especially those regarding ownership of data and social privacy. While the latter could be remedied by personalised privacy settings and the way one chooses to use SNSs (e.g. private versus public messaging), the former is less easily remedied by individual user choice. Although two of the studies considered Internet use (Braun 2013; Lüders and Brandtzaeg 2014), it was not clear from these studies whether privacy concerns were specific to SNSs or extended to other communication media. However, the increasing uptake of SNSs amongst older adults suggests that such concerns are not a major deterrent (OfCom 2016).

Many studies seemed to suggest that non-users simply perceived SNSs as unimportant for their needs and preferences. It is unclear whether this was because these individuals felt that their social, communication or information needs were being met elsewhere (e.g. through face-to-face contact, email etc.), or because they did not have the same needs or characteristics of SNS users (e.g. they might be more satisfied with their social life). The role of lack of

perceived competence in deterring older adults from using SNSs was more inconclusive, in part due to the high levels of education amongst samples (Braun 2013; Jung *et al.* 2017).

The impact of SNS use on social wellbeing was inconclusive, largely due to the predominance of cross-sectional data making it difficult to establish the direction of any relationship. Notably, Richter *et al.* (2013) found that SNS users were more socially engaged than non-users, highlighting the possibility that users' level of offline sociability accounts for any difference between social wellbeing in SNS users and non-users. Methodological and design limitations limit the conclusions that can be drawn from the intervention studies included in this review. As such, there is not currently sufficient evidence to support the assertion that SNS use (specifically sites such as Facebook, Twitter) exert a beneficial impact on social wellbeing amongst older adults.

One study found that subjective wellbeing was not specific to SNS use as it was also associated with online shopping (van Ingen, Rains and Wright 2017), highlighting the importance of considering general Internet use and wider communication practices when studying the relationship between SNS use and wellbeing. The same study found that SNS use reduced the impact of functional disability on wellbeing, suggesting that SNS use may be more beneficial for those with high levels of functional impairment. This suggests that SNS use may be more beneficial for particular groups e.g. those with restricted mobility, or 'older' older adults (aged 80+) (Sims, Reed and Carr 2017). However, the current review indicates that many older adults see SNSs as incompatible with their needs and preferences. It should therefore not be presumed that SNS use is preferable or beneficial for all older adults, and researchers should be wary of advocating SNSs as a panacea for challenges faced in later life.

The vast majority of research on the association between social wellbeing and SNS use has been conducted in adolescent, young adult, and to some degree middle-aged adult, populations. From this literature, longitudinal and experimental studies have provided stronger

evidence of a causal link between SNS use and wellbeing. In the former category, a study of adults (mean age approximately 48) suggested that, over time, a higher rate of certain behaviours on Facebook ('liking' posts, status updates and clicking on 'friends' links) was associated with a decline in mental health. The use of participants' SNS data, hence circumventing the oft poor reliability of self-report, strengthened the study's findings (Shakya and Christakis 2017). Furthermore, a study which had young adult participants rate affective wellbeing and Facebook use at regular intervals over a two-week period found that higher Facebook use was associated with reduced affective wellbeing and life satisfaction. By testing the direction of different relationships in the data, the study was able to demonstrate that higher Facebook use most probably led to a decline in affective wellbeing, rather than the other way around (Kross *et al.* 2013).

However, findings from experimental studies on adolescent and young adult populations suggest a more complex picture. They suggest that 'active' use of SNSs (e.g. status updates, sending messages) has a beneficial impact on subjective wellbeing (Deters and Mehl 2013; Fardouly *et al.* 2015; Verduyn *et al.* 2015), whereas 'passive' use of SNSs (e.g. browsing 'friends' pages) has a detrimental effect (Verduyn *et al.* 2015). These findings are supported by further longitudinal (Brandtzaeg 2012) and cross-sectional studies (Frison and Eggermont 2016; Rae and Lonborg 2015; Yang and Brown 2013). As such, it is possible that different types of SNS use have divergent effects on wellbeing.

Important to consider is how wellbeing is measured. Some experimental studies (Fardouly *et al.* 2015) measure changes in subjective wellbeing (*how do you feel right now?*) immediately after using SNS. Transient changes in mood do not amount to sustained changes in wellbeing over the longer term. As such, it is important for future research to consider not only how SNS is used, but to understand whether SNS use results in longer-term, meaningful differences for wellbeing.

Regarding this study's findings on cognitive function and SNS use, there was preliminary evidence from an intervention study that learning how to use an SNS website could have some benefit for an aspect of executive function. Learning how to use a non-social website did not demonstrate similarly beneficial effects, suggesting that the social component of the task was important. Notably, this is at odds with two studies showing that beneficial effects on cognition following a learning task were not due to the social component of the intervention (Chan *et al.* 2014; Park *et al.* 2014).

Methodological problems and limitations

A large proportion (43%) of the studies considered *Facebook* use only. Although *Facebook* represents the most popular SNS site amongst older adults in the United Kingdom (OfCom 2016), a narrow focus on *Facebook* means that the continued relevance of this literature is questionable as SNSs continues to evolve and develop.

With the exception of one study, all studies were conducted in Western countries, although English language restrictions applied in this review would have biased the papers identified. Research has indicated that cultural context encourages different types of SNS use (Lee *et al.* 2016). These findings therefore do not address possible cultural differences.

SNS use was often measured as a binary concept (use versus non-use) or in terms of time spent on SNSs. This overlooks important differences in how SNSs are used. Such differences may have implications for outcomes in wellbeing or cognitive function (Brandtzaeg 2012; Campisi *et al.* 2015; Rae and Lonborg 2015). On the premise that nurturing close relationships in later life leads to higher wellbeing (Carstensen 2006), SNS use for maintaining contact with family and close friends may indeed provide benefits for wellbeing. Incidentally, this was the most common motivation for using SNSs identified by this review. Furthermore, the gratifications sought by media users do not necessarily map onto the gratifications gained

(Katz, Blumer and Gurevitch 1974). For example, a user may seek closer connections with family and friends on SNSs, but not necessarily obtain them. This highlights the importance of studying outcomes as well as motives and activities on SNSs.

Implications for future research

Future research should consider general levels of sociability, broader communication practices (e.g. email, text messaging) and Internet use when examining the relationship between SNS use and social wellbeing or cognitive function. As well as addressing the issue of confounding (e.g. excluding the possibility that offline sociability accounts for any relationship between SNS use and wellbeing), it would also help to elucidate how SNS use fits into the broader context of individuals' social lives and communication practices. For example, it may help to distinguish between those who use SNSs to compensate for, or complement, existing social contact. To determine the direction of effect between SNS use and outcomes, future research should endeavour to use experimental or longitudinal designs where possible. Future research should consider how characteristics of older adults (e.g. age, gender, level of social integration, functional disability, cognitive function, technological attitudes) modify any relationship between SNS use and outcomes. Further research is also needed to isolate any active components of SNS interventions for cognition (e.g. social interaction component, learning component).

The now widespread use of SNSs (as well as the Internet) is changing the way that psychological research is conducted as well as raising new questions about the psychological and social consequences of its use. The availability of large-scale and cheap data from SNS sites allows studies to capture small effects through maximising statistical power (Gosling and Mason 2014). A recent study using large-scale data from an SNS found that political self-expression influenced online and offline voting behaviour (Bond *et al.* 2012). Similar studies

using large-scale SNS data have shown that online content can influence emotional states and subsequent behaviour; so called ‘emotional contagion’ (Coviello *et al.* 2014; Kramer, Guillory and Hancock 2014).

Beyond SNS as a means of studying social behaviour, it has been suggested that the social influence and information transmission afforded by SNSs could be used to influence behaviour (e.g. as part of public health campaigns) and social attitudes. Of particular relevance to gerontology, the social influence levied by SNSs may be used as a means of influencing health and lifestyle behaviours associated with the onset of ‘later life’ diseases such as dementia, or of challenging unhelpful stereotypes and narratives about ageing. However, the social transmission afforded by online social networks can also facilitate the propagation of false or unhelpful information (Giasemidis *et al.* 2016). Moreover, SNSs can facilitate ‘filter bubbles’ (Pariser 2011), in which individuals are exposed to information in keeping with pre-existing beliefs. Finally, the use of SNS data raises important ethical questions, most recently demonstrated by the Cambridge Analytica scandal in which the firm were reported to have harvested 50 million Facebook profiles without users’ consent (Cadwalladr and Graham-Harrison 2018). Hence caution needs to be applied when considering SNS and Internet use as a tool of social and behavioural change.

Limitations of the review

This review is based on a small number of studies. It includes unpublished literature since consideration of the wider literature can be helpful and illuminating in reviewing a new and emerging field such as this one (Arksey and O'Malley 2005). Furthermore, papers with higher quality were given more weight in drawing conclusions. Nevertheless, it is acknowledged that including non-peer reviewed literature may have compromised the quality of the papers included in this review.

This review focuses on SNS use and does not encompass Information Communication Technology or Internet use generally from an older adult perspective. This was because a broader focus may have obscured important differences between SNSs and other media, and because we considered that a specific focus on SNSs would render results more interpretable. However, future reviews could broaden the scope of enquiry to include other media, to determine the extent to which the findings in this paper are unique to SNS use or apply to other communication media. However, it is important to highlight that defining SNS, and therefore demarcating it from other media, was not straightforward during the process of conducting this review. Reasons for this include the rapidly evolving nature of the Web 2.0 (characterised by the change from static web pages to user-generated, and dynamic content) and the similarities between SNSs and other communication platforms (Obar and Wildman 2015). As such, as the information-technology sector evolves, it may become less viable or constructive to distinguish SNSs and other media in this way.

We did not include literature on ‘online communities’ in our review. ‘Online communities’ are held together by a common interest e.g. health conditions or issues around retirement. They are not an SNS per se, but rather use SNSs as a platform (e.g. comparable to *Facebook* groups formed around a common interest), however they can operate through diverse online applications including email, forums and blogs. As such, we considered that ‘online communities’ were better conceptualised as a general use or gratification of the Internet (alongside online shopping, distance learning or keeping in touch with friends), which may use SNSs a platform but do not constitute an SNS per se. However, we acknowledge that findings regarding online communities are highly pertinent to questions regarding Internet use amongst older adults. Analysis of online communities has suggested that older adults use online communities for emotional and practicable support regarding health and other topics pertinent to older adults such as retirement, as well as fun and play (Nimrod 2009; 2010). Future research

could explore whether belonging to a community characterised by a common interest affords unique benefits for social wellbeing.

Only papers with an average sample age of 65+ were shortlisted for this review and, as such, this did not preclude some samples from including adults younger than 65. In addition, ‘older’ older adults (aged 80+) were under-represented across studies, potentially due to the relative low uptake of SNSs amongst this age cohort.

Finally, many of the studies were conducted by a small number of research groups with access to the same dataset (Bell *et al.* 2013; Hutto *et al.* 2015; Jung and Sundar 2016; Jung *et al.* 2017; Yu, Ellison, *et al.* 2016; Yu, McCammon, *et al.* 2016). This is indicative of the small size of the field of SNSs and older adults. More heterogeneity might emerge as research in the field of SNSs and older adults continues.

Conclusions

The purpose of this systematic review was to identify, characterise and summarise existing research on SNS use from an older adult perspective. Because of the small number of papers, their variable quality, and the nature of a scoping review, the findings presented here should not be considered as conclusive answers to research questions but rather as a guide to the current state of this emerging field. Findings from this review help to inform future directions for research. Results indicated that SNS use is a multidimensional phenomenon that needs to be understood in the context of broader communication practices, individuals’ social relationships and individual preferences and characteristics. The challenge for future research is to continue to understand the nature and impact of SNS use for this population as it continues to evolve and develop with technological and social change.

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