REVIEW

The relationship between social media use and psychosocial outcomes in older adults: A systematic review

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ABSTRACT

Objectives: Social isolation and loneliness are prevalent in older adults and are detrimental to physical and mental health. Social media use has been shown to be effective in maintaining social connections and improving older adults' psychosocial outcomes. This study aimed to systematically review and synthesize current research on this topic.

Design: Searches were conducted in November 2021 (and updated in October 2023) in PsycINFO, PubMed, and CINAHL. Inclusion criteria: (1) participants $\geq$ 65 years (mean, median, or minimum age) and (2) reported impact of social media use on psychosocial outcomes (including loneliness, depression, anxiety, social connectedness, wellbeing, life satisfaction, and quality of life). Quality appraisal tools were utilized, and results were synthesized using narrative synthesis.

Results: Sixty-four papers met inclusion criteria, including cross-sectional ($n = 38$), observational longitudinal ($n = 6$), interventional ($n = 9$), mixed-methods ($n = 4$), and qualitative ($n = 7$) studies. Participant numbers ranged from 6 to 16,925. While associations between social media use and positive psychosocial outcomes were generally reported in cross-sectional studies, the impact of social media use over time from longitudinal studies was mixed and inconclusive.

Conclusions: While social media use is associated with positive psychosocial outcomes, casual conclusions cannot be drawn. Few longitudinal and randomized controlled trial studies existed, and these reported mixed findings. Large variations in study methodology including participants, measurement of social media use, and outcome measures contributed to the inconsistencies of findings. Addressing this heterogeneity through standardized approaches and more rigorous research may enhance understanding.

Key words: psychogeriatrics, anxiety, depression, loneliness, quality of life (QoL)

Introduction

Globally, the proportion of older persons is projected to more than double over the next three decades, reaching 16% in 2050 (United-Nations-Department-of-Economic-and-Social-Affairs, Population-Division, 2020). Research indicates that loneliness may follow a u-shaped trajectory across the lifespan, with the highest prevalence being in younger adulthood, lower rates during midlife, and

another peak in late life (Beam & Kim, 2020). Further, rates of social isolation increase in later life (Cornwell & Waite, 2009), and socially isolated people are more likely to experience depression (Heikkinen & Kauppinen, 2004), loneliness (Wigfield *et al.*, 2022), dementia (Livingston *et al.*, 2020), poor health, reduced wellbeing, and higher mortality (e.g. Patterson & Veenstra, 2010; Steptoe *et al.*, 2013), highlighting the need to find strategies to mitigate social isolation in older adults. Reasons for the increased social isolation in older adults are varied but include: (1) the impact of declining physical health in later life which reduces older people's ability to attend social activities, and (2) the reduced availability of social networks due to friends

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and family moving away or dying (Coyle & Dugan, 2012).

According to the Selective Optimization with Compensation (SOC) model (Baltes & Baltes, 1990), individuals adapt to aging-related challenges by selectively optimizing their resources and compensating for limitations. A compensatory strategy for older adults to overcome physical limitations that limit social connections is to socialize using Information and Communication Technologies (ICTs). Social media, also known as Social Networking Sites (SNSs), is an evolvement of ICT thanks to the emergence and rapid diffusion of Web 2.0 functionalities and falling costs for online data storage, with Facebook, Twitter, and Instagram being some well-known examples (Obar & Wildman, 2015). Although social media sites first became available in the early 2000's, it was not until around 2007 that social media use started to increase with the introduction of Facebook, Twitter, and YouTube (2004–2006), and the release of the first smartphone in 2007, which made social media sites easily accessible. Since then, social media use has exploded with over half the world's population using it (Ortiz-Ospina, 2019).

Although older adults interact with social media platforms less than younger adults, the frequency of internet and social media use in older adults has been rising in recent years (e.g. Anderson *et al.*, 2019; Silver *et al.*, 2019) making SNSs a promising option for increasing social interactions in this population. Studies have shown that using social media is associated with some benefits for older adults, including cognitive health (Quinn, 2018), feeling less loneliness and depression (Chopik, 2016), better social connectivity (Hage *et al.*, 2016), and quality of life (Nam, 2021).

Most of our current understanding of the interaction between social media use and psychosocial outcomes comes from research in younger people who make up the largest cohort of active social media users around the world (Erfani & Abedin, 2018). These studies have typically focused on either adolescent samples or general samples (primarily composed of young adults). Reviews exploring the effects of social media use on adolescents predominantly highlight negative psychosocial outcomes, particularly when usage patterns exhibit addictive or problematic tendencies (e.g. Webster *et al.*, 2021). In contrast, reviews employing young adult samples yielded more mixed findings, with both positive and negative outcomes being reported (e.g. Huang, 2017). Multiple factors such as personality, social anxiety, self-esteem, and need to belong have been shown to influence how social media affects psychosocial outcomes in these populations (Smith *et al.*, 2021). Some of the

mediators underlying the association between social media use and negative psychosocial outcomes in young individuals are insomnia and other sleep-related factors, perceived social support, rumination, social comparison, body image concerns, and social media ostracism (Keles *et al.*, 2020; Nesi, 2020; Webster *et al.*, 2021). There is also some evidence that the relationship between social media use and psychosocial outcomes is bidirectional, with some studies finding that socially anxious and lonely young adults use social media more frequently, more intensely, and more addictively and thus may result in negative outcomes (O'Day & Heimberg, 2021). However, findings predominantly describe associations drawn from cross-sectional study designs, and thus causal conclusions cannot be drawn.

The impact of social media use on psychosocial outcomes may differ for older adults compared to younger users due to variations in the size and quality of older adults' social network and ways in which older adults use social media. Older adults tend to maintain smaller but higher-quality social networks, primarily comprising family and close friends (Rylands & Van Belle, 2017; Sims *et al.*, 2017). They prioritize direct communication activities that foster emotional connections, while younger adults often engage in broadcasting activities to larger networks, potentially leading to social comparison and exposure to diverse content (Kim & Shen, 2020). These age-related distinctions could potentially result in age-related differences in the impact of social media use on psychosocial outcomes. That is, social media use in older adults may be more likely to result in increased engagement with higher-quality social networks and therefore more likely to be associated with positive outcomes.

Several review papers have explored the effects of ICT interventions, social media use, and video calls on social isolation and/or social participation in older adults (Baker *et al.*, 2018; Chen & Schulz, 2016; Khosravi *et al.*, 2016; Noone *et al.*, 2020), with some reviews focusing only on cross-sectional or experimental studies (Casanova *et al.*, 2021), and others only on participants with specific living arrangements (e.g. living in communities or in assisted living facilities; Fuss *et al.*, 2019). Overall, these reviews found ICTs or social media use have the potential to improve older adults' social participation and psychosocial wellbeing. However, no causal conclusions can be drawn because most of the studies were cross-sectional. Authors of those reviews suggested more well-designed studies examining the impact of social media use on older adults' psychosocial outcomes in-depth.

Recently, Wiwatkunupakarn *et al.* (2022) systematically examined the relationship between

social media use and social isolation, loneliness, and depression among older adults specifically and found a few observational and experimental studies supporting an association between social media use and lower depression and loneliness, while the relationship between social media use and social isolation remains unclear. However, their review was limited by combining general internet use and social media use outcomes together as well as excluding the impacts of social media use on anxiety and other aspects of psychosocial wellbeing. Given findings in younger samples that social media use is specifically associated with anxiety and other psychosocial wellbeing outcomes (Keles *et al.*, 2020; Smith *et al.*, 2021), it is important to examine the impact of social media on these outcomes also in older samples. Given the overlapping nature of various psychosocial outcomes, it is important to examine broad outcomes of social media use in older adults to try to tease apart whether social media use might be associated with some factors more than others. For instance, social media use may be less associated with loneliness in older adults if their social media use is primarily focused on interactions with close family and friends, as some evidence has shown that compared to individual relationships with family and friends, social groups that older adults strongly identified with were more important in providing a basis for receiving social support (Haslam *et al.*, 2016). It is also important to further examine the literature to try to isolate key potential causal mechanisms associated with positive or negative effects of social media use. This information is important for guiding future social media interventions that promote positive outcomes and mitigate negative ones.

Since 2007, social media's popularity has skyrocketed due to widespread internet access and smart mobile devices (Sajithra & Patil, 2013). Therefore, the current systematic review aimed to explore the most recent literature (from 2007 to current date) to examine the impact of older adults' social media use on a broad range of psychosocial outcomes. It included not only SNSs but also other ICT programs (e.g. discussion forums and Skype) and customized older adult-friendly social networking interventions (e.g. customized iPad-based application [Judges *et al.*, 2017]) that share similar online socializing functions of social media. Additionally, the current review aimed to synthesize the effects of social media use on older adults' psychosocial outcomes across loneliness, depression, anxiety, social connectedness, social isolation, life satisfaction, quality of life, and wellbeing without restriction on participants' living arrangements or study design. Finally, the current review also aimed to synthesize the findings regarding the mediators of

the relationship between social medial use and older adults' psychosocial outcomes so that the important components of social media use could be better understood.

Method

Search strategy, inclusion criteria, and study selection

A systematic search strategy was designed to address the key aims of the review as outlined above. In this review, social media formats encompassing a wide range of sites, platforms, and apps enable communication through varied formats including sending and receiving text messages, photos, voices, videos, making voice/video calls, video conferencing and creating, sharing and responding to posts through smartphones, tablets, or computers. This review was prospectively registered on the PROSPERO database for systematic reviews (CRD42022289949) and was conducted according to PRISMA guidelines. Search terms were developed against the PICO statement (Population, Intervention, Comparison, Outcome). The population was defined as older adults who were aged 65 years or older. The intervention was defined as the use of social media (as defined above). The comparison was between less frequent social media users and frequent users or between users and nonusers. Outcomes were defined as measures of psychosocial outcomes including emotional (i.e. loneliness, depression, anxiety, and suicidality), social (i.e. social isolation, social connectedness, and relatedness), and overall wellbeing (including life satisfaction and quality of life) outcomes. The inclusion criteria were: (1) peer-reviewed articles reporting original results; (2) published in English between January 2007 and October 2023; (3) participants' mean age (or median or minimum age if the mean age was not reported) was 65 years or older; and (4) examined the impact of social media use (see definition) on psychosocial outcomes. A full list of search terms can be seen in the Appendix.

Electronic searches for this systematic review were conducted in November 2021 (first updated search in December 2022 and second updated search in October 2023) using three databases PsycINFO, PubMed, and CINAHL (Cumulative Index of Nursing and Allied Health Literature). The following filters were used in the database search: year: 2007 to current; language: English; age group: older adults 65 + years; article type: journal articles. The search of databases yielded 3745 publications (CINAHL: 807, PubMed: 2587, and PsycINFO: 339), of which 581 duplicates were

removed. An additional 12 papers were identified in review papers. A total of 3164 studies were screened by two researchers independently (XL and DM for the initial search, XL and AV for the first updated search, and XL and W-YL for the second updated search) to determine study inclusion/exclusion, first by title and abstract, and then by full text. Conflicts were resolved through discussion between the two researchers, with the option to consult the third researcher (author VW) if the conflict was not resolved. A total of 64 articles met the inclusion criteria and were retained for this systematic review. See the PRISMA flow diagram in Supplementary Figure S1.

Data extraction and synthesis

Data from the 64 studies were extracted and synthesized which included study population, study location, publication type, social media used, study intervention (if applicable), study methods, study length, control variables, study outcome measures, and key findings. Data extraction was performed by the first author and checked for accuracy by another author (DM for the initial search, AV for the first updated search, and W-YL for the second updated search).

Quality review

Longitudinal and cross-sectional studies were evaluated with the National Institute of Health (NIH) study quality assessment tools for observational cohort and cross-sectional studies. Interventional studies were assessed with the NIH study quality assessment tools for before-after (pre-post) studies. The Critical Appraisal Skills Program (CASP) qualitative research checklist was used to assess qualitative and mixed-methods studies. Two researchers independently performed the quality assessment (XL and W-YL). In case of any discrepancy, a consensus was reached after discussion and reevaluation between two researchers and if necessary, the opinion of a third member of the review team was requested.

Results

Quality of the included studies

Quantitative studies were assessed against several quality criteria in the NIH study quality assessment tools, such as research questions, study population, participation rate, inclusion criteria, sample size, exposure prior to outcome, etc., specific to study designs (see details in Tables 1 and 2). According to rating standards adopted by previous studies (Akiboye *et al*., 2021; Bagias *et al*., 2021), four of the

six longitudinal studies were rated as "good" and 2 were rated as "fair" in quality. All 38 cross-sectional studies were rated as "fair" in quality. For the nine interventional studies, four were rated as "good" and five were rated as "fair" in quality.

The quality of qualitative ($n = 7$) and mixed-methods ($n = 4$) studies was assessed against the CASP qualitative research checklist. For all studies, there was a clear aim, the qualitative methodology was deemed appropriate and used appropriate recruitment methods, and they were deemed to have collected data in a way that address the research issue, analyzed data rigorously, and stated their findings and the value of their research. Six out of 11 studies justified the choice of the research design and 5 out of 11 studies provided information regarding ethics approval. Only one study reported on consideration of the relationship between the researcher and participants. Details of the quality assessment for each study can be seen in Tables 1–3.

Study and participant characteristics

The 64 studies retained were conducted in 20 different countries with the highest number coming from the United States ($n = 17$). One multi-site study (Yachin & Nimrod, 2021) was conducted across seven countries. Across the studies, the number of participants included ranged from 6 to 16,925, the percentages of females ranged from 42% to 100%, and 56 studies recruited community-dwelling samples, six studies used participants from aged care facilities, and two studies recruited both community-dwelling older adults and aged care residents. Included studies employed various methods: 53 were quantitative studies, 7 were qualitative, and 4 were used mixed-methods. Of the 53 quantitative studies, 38 were cross-sectional, 6 were observational longitudinal, and 9 were interventional.

Quantitative studies

In the cross-sectional and longitudinal studies, social media use was measured in various forms, including social media user status (i.e. user vs. nonuser, $n = 15$), frequency of social media use ($n = 18$), duration of use ($n = 5$), frequency of using specific social media functions (e.g. checking vs. posting, $n = 4$), the number of online applications used ($n = 2$), changes in social media use (i.e. increase of social media use during the COVID-19 pandemic and loss of social resources on social media, $n = 2$), and Facebook network size ($n = 1$). The interventions used in the interventional studies included online video conferencing apps ($n = 3$) and training in using social media apps ($n = 5$) or a customized online social networking platform

Table 1. Studies (cross-sectional and longitudinal) assessed using the NIH quality assessment tool for observational cohort and cross-sectional studies

Study	1. Was the research question or objective in this paper clearly stated?	2. Was the study population clearly specified and defined?	3. Was the participation rate of eligible persons at least 50%?	4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	5. Was a sample size justification, power description, or variance and effect estimates provided?	6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	7. Was the time frame sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g. categories of exposure, or exposure measured as continuous variable)?	9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	10. Was the exposure(s) assessed more than once over time?	11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	12. Were the outcome assessors blinded to the exposure status of participants?	13. Was loss to follow-up after baseline 20% or less?	14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Summary Quality
Aarts et al., (2015)	Y	Y	Y	Y	N	N	N	Y	N	N	Y	NA	NA	Y	Fair
Ang & Chen, 2019	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	NR	Y	Y	Good
Bertić & Telebuh, 2020	Y	Y	Y	Y	NR	N	N	Y	N	N	Y	NA	NA	N	Fair
Byrne et al., 2021	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Challands et al., 2017	Y	Y	NR	Y	NR	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Chen et al., 2023	Y	Y	NR	Y	Y	N	N	Y	N	N	Y	NA	NA	Y	Fair
Chiarelli & Batistoni, 2021	Y	Y	NR	Y	NR	N	N	Y	Y	N	Y	NA	NA	N	Fair
Chopik, 2016	Y	Y	Y	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Clark & Moloney, 2020	Y	N	NR	Y	NR	N	N	Y	Y	N	Y	NA	NA	N	Fair
Francis, 2022	Y	Y	NR	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Dhakal et al., 2023	Y	Y	Y	Y	N	N	N	Y	N	N	N	NA	NA	Y	Fair
Gaia et al., 2021	Y	Y	NR	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Hage et al., 2016	Y	Y	Y	Y	NR	Y	Y	Y	N	Y	N	NR	N	Y	Fair
Hajek & König 2022	Y	Y	Y	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Hofer & Hargittai, 2021	Y	Y	NR	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Hutto et al., 2015	Y	N	Y	Y	NR	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Jeon et al., 2020	Y	Y	Y	Y	NR	N	N	NA	N	N	Y	NA	NA	Y	Fair
Jung & Sundar, 2022	Y	Y	Y	Y	NR	N	N	Y	Y	N	Y	NA	NA	N	Fair
Lau et al., 2016	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Lewin et al., 2023	Y	Y	NR	Y	N	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Lin et al., 2020	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	NA	NA	Y	Fair
Mu et al., 2023	Y	Y	Y	Y	N	N	N	N	CD	N	Y	NA	NA	Y	Fair
Nakagomi et al., 2022	Y	Y	Y	Y	Y	Y	Y	N	N	N	Y	NR	Y	Y	Fair
Nam, 2021	Y	Y	NR	Y	Y	N	N	NA	N	N	Y	NA	NA	N	Fair
Nimrod, 2020	Y	Y	NR	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Sakurai et al., 2021	Y	Y	N	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Sala et al., 2021	Y	Y	Y	Y	NR	N	N	N	N	N	Y	NA	NA	Y	Fair
Schwaba et al., 2021	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	NR	NR	Y	Good
Simons et al., 2023	Y	Y	NR	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Sims et al., 2017	Y	Y	NR	Y	NR	N	N	Y	N	N	Y	NA	NA	Y	Fair
Szabo et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	NR	Y	Y	Good
Teo et al., 2019	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	NA	NA	Y	Good
Van Boekel et al., 2017	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	NA	NA	N	Fair
Van Ingen et al., 2017	Y	Y	NR	Y	Y	Y	Y	Y	N	N	Y	NR	N	N	Fair
Wallinheimo & Evans, 2021	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	NA	NA	Y	Fair
Wu & Chiou, 2020	Y	Y	NR	Y	NR	N	N	N	N	N	Y	NA	NA	Y	Fair

Table 1. Continued

Study	1. Was the research question or objective in this paper clearly stated?	2. Was the study population clearly specified and defined?	3. Was the participation rate of eligible persons at least 50%?	4. Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?	5. Was a sample size justification, power description, or variance and effect estimates provided?	6. For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?	7. Was the time frame sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?	8. For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g. categories of exposure, or exposure measured as continuous variable)?	9. Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	10. Was the exposure(s) assessed more than once over time?	11. Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?	12. Were the outcome assessors blinded to the exposure status of participants?	13. Was loss to follow-up after baseline 20% or less?	14. Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?	Summary Quality
Yang et al., 2021	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	NA	NA	Y	Fair
Yang et al., 2022	Y	Y	Y	Y	Y	N	N	Y	N	N	Y	NA	NA	Y	Fair
Yang et al., 2021	Y	Y	Y	Y	NR	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Yang et al., 2022	Y	Y	NR	Y	NR	N	N	NA	N	N	Y	NA	NA	Y	Fair
Yu et al., 2016	Y	Y	Y	Y	Y	N	N	NA	N	N	Y	NA	NA	Y	Fair
Zhang et al., 2021	Y	Y	Y	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair
Zhang et al., 2023	Y	Y	Y	Y	NR	N	N	Y	CD	N	N	NA	NA	Y	Fair
Zhou, 2018	Y	Y	NR	Y	Y	N	N	Y	Y	N	Y	NA	NA	Y	Fair

*CD, cannot determine; NA, not applicable; NR, not reported.

Table 2. Studies (interventional) were assessed using the NIH quality assessment tool for before-after (pre-post) studies

Study	1. Was the study question or objective clearly stated?	2. Were eligibility/selection criteria for the study population prespecified and clearly described?	3. Were the participants in the study representative of those who would be eligible for the test/service/intervention in the general or clinical population of interest?	4. Were all eligible participants that met the prespecified entry criteria enrolled?	5. Was the sample size sufficiently large to provide confidence in the findings?	6. Was the test/service/intervention clearly described and delivered consistently across the study population?	7. Were the outcome measures prespecified, clearly defined, valid, reliable, and assessed consistently across all study participants?	8. Were the people assessing the outcomes blinded to the participants' exposures/interventions?	9. Was the loss to follow-up after baseline 20% or less? Were those lost to follow-up accounted for in the analysis?	10. Did the statistical methods examine changes in outcome measures from before to after the intervention? Were statistical tests done that provided p values for the pre-to-post changes?	11. Were outcome measures of interest taken multiple times before the intervention and multiple times after the intervention (i.e. did they use an interrupted time-series design)?	12. If the intervention was conducted at a group level (e.g. a whole hospital, a community, etc.) did the statistical analysis take into account the use of individual-level data to determine group effects at the group level?	Summary quality
Hwang et al., 2021	Y	Y	Y	Y	CD	Y	Y	NR	Y	Y	N	NA	Fair
Larsson et al., 2016	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	N	NA	Good
Morton et al., 2018	Y	Y	Y	Y	N	Y	Y	NR	N	Y	N	NA	Fair
Quinn, 2021	Y	Y	Y	Y	N	Y	Y	NR	Y	Y	N	NA	Fair
Rolandi et al., 2020	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	N	NA	Good
Tsai et al., 2020	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	Y	NA	Good
Tsai et al., 2011	Y	Y	Y	Y	Y	Y	Y	NR	Y	Y	N	NA	Good
Tsai et al., 2010	Y	Y	Y	Y	N	Y	Y	NR	Y	Y	N	NA	Fair
Woodward et al., 2010	Y	Y	Y	Y	N	Y	Y	NR	Y	Y	N	NA	Fair

*CD, cannot determine; NA, not applicable; NR, not reported.

Table 3. Studies (qualitative) assessed using the CASP qualitative research checklist

Study	1. Was there a clear statement of the aims of the research?	2. Is a qualitative methodology appropriate?	3. Was the research design appropriate to address the aims of the research?	4. Was the recruitment strategy appropriate to the aims of the research?	5. Was the data collected in a way that addressed the research issue?	6. Has the relationship between researcher and participants been adequately considered?	7. Have ethical issues been taken into consideration?	8. Was the data analysis sufficiently rigorous?	9. Is there a clear statement of findings?	10. How valuable is the research?
Ballantyne *et al.*, 2010	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Barbosa Neves *et al.*, 2019	Y	Y	Y	Y	Y	CT	Y	Y	Y	Y
Jarvis *et al.*, 2019	Y	Y	Y	Y	Y	CT	N	Y	Y	Y
Johansson-Pajala *et al.*, 2023	Y	Y	Y	Y	Y	CT	Y	Y	Y	Y
Judges *et al.*, 2017	Y	Y	CT	Y	Y	CT	N	Y	Y	Y
Pera *et al.*, 2020	Y	Y	Y	Y	Y	CT	N	Y	Y	Y
Hemberg & Santamäki, 2018	Y	Y	CT	Y	Y	CT	Y	Y	Y	Y
Hong *et al.*, 2021	Y	Y	CT	Y	Y	CT	N	Y	Y	Y
Siniscarco *et al.*, 2017	Y	Y	CT	Y	Y	CT	Y	Y	Y	Y
Torp *et al.*, 2008	Y	Y	Y	Y	Y	CT	Y	Y	Y	Y
Yachin & Nimrod, 2021	Y	Y	CT	Y	Y	CT	Y	Y	Y	Y

($n = 1$). Eight of the nine interventional studies compared the intervention groups to the control groups.

Loneliness

Twenty-six quantitative studies investigated the relationship between social media use and loneliness, including cross-sectional studies ($n = 17$), longitudinal studies ($n = 2$), and interventional studies ($n = 7$). Most studies measured loneliness with various forms of the De Jong-Gierveld Loneliness Scale (De Jong Gierveld & Van Tilburg, 2006; $n = 10$) and the UCLA Loneliness Scale (Russell, 1996; $n = 13$). The Social and Emotional Loneliness Scale for Adults (DiTommaso & Spinner, 1993; $n = 1$) and a single question ($n = 2$) were also used to measure loneliness. In general, the cross-sectional studies found that greater social media use was associated with lower rates of loneliness ($n = 13$). This was replicated across a wide range of social media use measures such as user status, frequency of use, number of online applications used, and duration of use. Results of longitudinal studies were mixed, with one of the two studies reporting that more frequent social media use predicted reduced loneliness over time (Szabo et al., 2019), while the other found no association between time spent on social media and loneliness over time (Schwaba et al., 2021). Similarly, the interventional studies reported mixed results. While some interventions that attempted to increase older persons' use of social media were associated with improvements in loneliness ($n = 4$; e.g. Tsai et al., 2010), some were not ($n = 3$; e.g. Quinn, 2021).

Depression

Twenty-two quantitative studies investigated the relationship between social media use and depressive symptoms, including cross-sectional studies ($n = 12$), longitudinal studies ($n = 4$), and interventional studies ($n = 6$). Most studies measured depressive symptoms with various forms of the Geriatric Depression Scale (Yesavage & Sheikh, 1986; $n = 7$) and the Center for Epidemiologic Studies Depression Scale (Radloff, 1977; $n = 9$). The Patient Health Questionnaire (Yeung et al., 2008; $n = 3$), the Mental Health Screening Test (Berwick et al., 1991; $n = 1$), Hopkins Symptom Checklist (Kleppang et al., 2016; $n = 1$), and customized single question ($n = 1$) were also used. In general, the cross-sectional studies reported that greater social media use was associated with fewer depressive symptoms ($n = 6$). This was replicated across a wide range of social media use measures, such as user status, frequency of use, the number of online applications used, and duration of use.

Similarly, most interventional studies ($n = 4$) reported that social media-related interventions including video conferencing and training in using social media platforms were effective in reducing depressive symptoms (Hwang et al., 2021; Morton et al., 2018; Tsai et al., 2010; Tsai & Tsai, 2011). However, the results from the longitudinal studies were mixed, with two of the studies reporting that social media use predicted fewer depressive symptoms over time (Nakagomi et al., 2022; Teo et al., 2019) and two studies showing no association between social media use over time and depressive symptoms (Ang et al., 2019; Schwaba et al., 2021).

Life satisfaction, subjective wellbeing, and quality of life

Seventeen quantitative studies investigated the relationship between social media use and older adults' outcomes in life satisfaction, subjective wellbeing, and quality of life. This included cross-sectional studies ($n = 14$), longitudinal studies ($n = 1$), and interventional studies ($n = 2$). Most studies measured the dependent variables with various forms of the Life Satisfaction Scale (Diener et al., 1985; $n = 10$) and customized single question ($n = 3$). The remaining four studies used the World Health Organization-Five Well-Being Index (Awata et al., 2007), Mental Health Inventory (Berwick et al., 1991), Quality of Life Scale by Flanagan (1978), and the Control, Autonomy, Self-realization and Pleasure scale (Wiggins et al., 2008) to assess outcomes. Nine of the 14 cross-sectional studies reported positive associations between greater social media use and improved outcomes, and this was replicated across different social media use measures such as user status, frequency of social media use, Facebook network size, and number of online social applications used. Although the only longitudinal study found time spent on social media did not predict life satisfaction over time (Schwaba et al., 2021), two interventional studies showed that training older adults to use online social platforms improved participants' life satisfaction/quality of life (Morton et al., 2018; Woodward et al., 2010).

Anxiety

Four quantitative studies investigated the relationship between social media use and symptoms of anxiety, including cross-sectional studies ($n = 3$) and an interventional study ($n = 1$). Scales used to measure anxiety included the Beck Anxiety Inventory (Beck et al., 1988; $n = 2$), the State-Trait Anxiety Inventory (Marteau & Bekker, 2020; $n = 1$), and the Geriatric Anxiety Inventory (Byrne & Pachana, 2011; $n = 1$). Overall, the three cross-sectional studies found social media use was unrelated

to anxiety, and this was replicated across different social media use measures including frequency of using social media in general (Yang *et al.*, 2022), social resource loss on social media (Lau *et al.*, 2016), and frequency of looking at family photos and asking questions on social media (Hofer & Hargittai, 2021). However, the interventional study found that training older adults to use a customized online social platform reduced participants' anxiety indirectly through increased competence (Morton *et al.*, 2018). One cross-sectional study (Chen & Miao, 2023) examined the relationship between online social networking and psychological distress (including two dimensions: anxiety and depression) and found that older adults who socialize online reported less psychological distress than those who do not.

SOCIAL CONNECTEDNESS AND RELATEDNESS

Four quantitative studies investigated the relationship between social media use and older adults' social connectedness or relatedness, including cross-sectional studies (*n* = 2), an interventional study (*n* = 1), and a longitudinal study (*n* = 1). Social connectedness or relatedness was measured with the Social Connectedness Scale (Lee *et al.*, 2001, *n* = 2), the Balanced Measure of Psychological Needs Scale (Sheldon & Hilpert, 2012), and a customized scale. Only one cross-sectional study (Clark & Moloney, 2020) found that more frequent social media use was associated with higher relatedness, and the other three studies (Challands *et al.*, 2017; Hage *et al.*, 2016, Quinn, 2021) did not find an association between social media use and social connectedness.

Qualitative studies and mixed-methods studies

Seven studies used qualitative methods, and all had relatively small sample sizes (*n* = 6–19) except one multi-site study (*n* = 184). The majority of participants were females in all but one sample.

Four of the seven qualitative studies used interventions (i.e. trained participants to use social media). Participants' experience of the interventions was gathered via interviews or focus group discussions. Overall, their experience was positive, and the interventions were effective in reducing and managing loneliness (Ballantyne *et al.*, 2010), facilitating network building (Jarvis *et al.*, 2019), enhancing the frequency and quality of communication with friends and family (Judges *et al.*, 2017), and improving subjective wellbeing (Hemberg & Santamäki, 2018). However, for participants who were not motivated to communicate with others or had difficulty using an iPad, fewer positive effects were reported (Judges *et al.*, 2017).

The remaining three qualitative studies were noninterventional, in which older adult social media users were recruited and interviewed. Participants reported multiple benefits of social media use, including improved subjective wellbeing (Pera *et al.*, 2020), enhanced connectedness with relatives and friends, reduction in loneliness (Hong *et al.*, 2021), and enhanced feeling of being part of the world and sense of relevance (Yachin & Nimrod, 2021).

Four studies used mixed-methods, and all had small sample sizes (*n* = 8–28) and used interventions (i.e. training and support in using Skype, customized communication apps, and an online discussion forum). Psychosocial outcomes examined include loneliness, depression, social support, and general mental health. Only one study showed quantitatively that using a customized online social interaction platform reduced participants' self-reported loneliness (Johansson-Pajala *et al.*, 2023), and the remaining studies showed no significant effect of the interventions on the outcome variables measured. However, participants reported benefits gained through the interventions in interviews or open-ended questions, such as enjoyment of seeing or talking with close family or friends via Skype (Siniscarco *et al.*, 2017), enhanced sense of wellbeing (Barbosa Neves *et al.*, 2019), increased sense of belonging, emotional support, and facilitation in offline network building (Torp *et al.*, 2008). See Tables 4 and 5 for summaries of all included studies.

Mediators

Eleven of the identified studies investigated mediators of the relationship between social media use and psychosocial outcomes in older adults to understand the key mechanisms underlying this relationship. Nine of these studies found that social support and social contact/engagement mediated the relationship between social media use and loneliness, depressive symptoms, quality of life, and life satisfaction (Byrne *et al.*, 2021; Lin *et al.*, 2020; Nam, 2021; Sims *et al.*, 2017; Szabo *et al.*, 2019; Wu & Chiou, 2020; Yang *et al.*, 2021; Zhang *et al.*, 2021; Zhou, 2018). Two studies found that increased feeling of competence mediated the relationship between social media use and loneliness and wellbeing (Francis, 2022; Jung & Sundar, 2022).

Discussion

This review examined the findings from 64 studies examining social media use and psychosocial outcomes in older samples. Overall findings were mixed, and it is likely due to wide variations in

Table 4. Summary of quantitative studies including mixed-methods studies

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Aarts et al., 2015 The Netherlands	Cross-Sectional	N = 626 M = 66.9 49.5%	Frequency of using Social Network Sites (SNSs) in the past 2 months	Sex, age, education level, living arrangement, medical conditions, and difficulties in carrying out activities.	De Jong-Gierveld Loneliness Scale, Mental Health Inventory- 5	SNS usage was unrelated to loneliness or mental health. Frequent users of SNS did not show any difference regarding loneliness or mental health as compared to individuals who used SNS to a lesser extent or to those who did not use SNS at all.
Ang & Chen, 2019 US	Observational longitudinal	N = 3401 M = 65 + 57.9%	Whether or not used SNSs in the last month.	Sleep problems, comorbidity, disability, cognitive function, other online activities, sociodemographic characteristics, and living arrangement	Two-item Patient Health Questionnaire	Online social participation buffered against the negative effects of pain on depression despite not having a direct effect on depression at one year follow-up.
Barbosa Neves et al., 2019 Canada	Mixed- methods	N = 12, M = 82.5 67%	Three-month intervention using iPad-based communication app that supports older adults' asynchronous communication with family and friends including sending and receiving photos, audio, video, and text messages.	None	Short Revised UCLA Loneliness Scale (3-item); Duke Social Support Scale. In-depth data were also collected through field observations; semi-structured interviews with participants and study partners	No significant changes in any of the scales used within and across participants. Qualitative analysis demonstrated that the intervention increased perceived social interaction with ties, but increased social connectedness was only reported by participants with geographically distant relatives. Sense of wellbeing and confidence with technology was enhanced, but negative effects were also observed.
Bertić & Telebuh, 2020 Croatia	Cross-sectional	N = 101, M = 71 56.4%	Frequency of using computer for video calls, social networks, or chat applications (Viber, Skype, WhatsApp, etc.) during the COVID-19 pandemic.	None	Social and Emotional Loneliness Scale for Adults, consisted of three subscales separately examining social loneliness, family loneliness, and loneliness in love	Respondents who constantly or occasionally communicated by mobile chat applications information technology showed lower levels of social and family loneliness when compared to the respondents who never or very rarely communicated in the above-mentioned ways.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Byrne *et al.*, 2021 US	Cross-sectional	N = 4315 M = 69.79 (9.86) 60.6%	Frequency of using social media	Marital living arrangement, age, and general computer usage	Revised UCLA Loneliness Scale	Direct positive main effect of social technology use on loneliness was found. Use of social technology increases social contact and social engagement and overall mitigates loneliness.
Challands *et al.*, 2017 Australia	Cross-sectional	N = 108 M = 73.7 (7.37) 53%	Facebook user or not	General health and age	Social Connectedness Scale	Facebook users were not significantly more socially connected in the online environment than the nonusers.
Chen & Miao, 2023 China	Cross-sectional	N = 2952 M = 65.9 (7.7) 51%	Frequency of internet access for social networking.	Demographic characteristics, educational attainment, hukou type, self-reported health status, employment status, and living with a household member younger than 55 years of age	Psychological distress (anxiety and depression) was assessed with the Hopkins Symptom Checklist (HSCL-10)	Older adults who used the internet for social networking reported better mental health than nonusers.
Chiarelli & Batistoni, 2021 Brazil	Cross-sectional	N = 130 M = 67.9 82.3%	Facebook network size	None	Life Satisfaction Scale	No relationship was found between network size and life satisfaction.
Chopik, 2016 US	Cross-sectional	N = 591 M = 68.18 (10.75) 55.5%	Number of social technologies used	Age, gender, and years of education	Customized loneliness scale, Satisfaction with Life Scale, Center for Epidemiological Studies Depression Scale	Greater technology use was associated with lower loneliness and lower depression, unrelated to subjective wellbeing.
Clark & Moloney, 2020 Australia	Cross-Sectional	N = 127 M = 70.67 (5.79) 60.6%	Frequency of use and time spent on Facebook	None	Balanced Measure of Psychological Needs Scale	More frequent Facebook users reported significantly higher relatedness compared to less frequent users. Time spent on Facebook was related to relatedness for participants who did not work but not for those who work.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Dhakal et al., 2023 US	Cross-sectional	N = 2564 M = 77 54.9%	Frequency (average in a week) of using social media messages and video calls	Demographics, social network size, accessibility to ICTs, and digital literacy, presence of vision and hearing impairment, and change in income during COVID-19	"How often did you feel lonely in a typical week during the COVID-19 outbreak?" "Is this more often, less often, or about the same as a typical week before the COVID-19 outbreak started?"	Greater frequency of contact with family and friends by electronic and social messaging, compared with those who reported less than once a week/never usage was associated with higher odds of reporting loneliness during COVID-19 versus pre-COVID-19. Frequency and usage of phone calls and video calls with FF were not significantly related to loneliness during COVID-19.
Francis, 2022 US	Cross-sectional	N = 517 M = 70 (4.23) 50%	Frequency of Facebook activities including: "update your status," "view others' profiles," "receive wall posts from others," "write messages to others."	Depression, Facebook intensity, general self-reported health status, ICT use, relationship status, age, race, education, income, and employment status	UCLA Loneliness Scale (ULS-8).	Facebook activities has a significant and positive relationship with mattering and a significant and negative relationship with loneliness for elder orphans. Mattering fully mediates the relationship between frequency of Facebook activities and loneliness.
Gaia et al., 2021 Italy	Cross-sectional	N = 7566 65 + 41%	Frequency of using social networking sites	Gender, education, income, social status, marital status, and employment	Self-reported life satisfaction: "On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?"	Respondents using SNSs three times a week or less often do not report levels of life satisfaction statistically different from those of respondents who do not use SNSs, while frequent SNS users have a higher level of life satisfaction than those who do not use them.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Hage *et al.*, 2016 The Netherlands	Observational longitudinal	N = 337 65 + 52.8%	Facebook and email (use or nonuse)	Initial connectivity	Social connectivity (measured with a customized scale)	Email use had a negative impact on village connectivity while not affecting connectivity with friends. Facebook use negatively impacted on connectivity with friends, but not on village connectivity. The negative effects were not found among those older adults that were already well connected.
Hofer & Hargittai, 2021 Switzerland	Cross-sectional	N = 1026 M = 69.3 (6.2) 57%	Frequency of engaging in seven social media activities	Sociodemographic variables, perceived health, and general internet experiences (i.e. frequency of use, autonomy of use, and internet skills)	Anxiety and depression symptoms using the Beck Anxiety Inventory and Center for Epidemiologic Studies Depression Scale	Checking in on someone who was suddenly absent from an online community was positively related to anxiety. Looking at status updates was negatively related to anxiety; looking at photos of others (i.e. not family members) was positively related to anxiety' checking in on a suddenly missing person and answering questions online were positively related to depressive symptoms; looking at family photos and asking questions were not related to depression or anxiety. The explanatory power of the forms of online social engagement in terms of anxiety and depression is marginal.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Hutto et al., 2015 US	Cross-sectional	$N = 141$ $M = 71.17$ (10.69) 67.4%	SNS user status and frequency of using a list of Facebook activities	Age, gender, ethnicity, education and income, and marital status	UCLA Loneliness Scale	No difference was found between social media users and nonusers in loneliness. Social media buffers the negative effect of age on loneliness. Perceived loneliness did not differ significantly between Facebook users and nonusers. Frequently using directed communication and passive consumption of Facebook content was associated with less loneliness.
Hwang et al., 2021 US	Interventional	$N_{t1} = 197$ $N_{t2} = 159$ $M = 76.26$ (7.38) 73.6%	Providing access to a support website designed to enable peer support through a web-based discussion forum.	Offline support networks	Patient Health Questionnaire	Web-based message consumption reduced depressive symptoms above and beyond the reduction generated by offline social connectedness, while web-based message production did not affect depressive symptoms 1 year later.
Jeon et al., 2020 South Korea	Cross-sectional	$N = 10,073$ 65 + 57.5%	SNS user status (user vs. nonuser)	Age, area of residence, living arrangement, education, economic activity, income, and relationship satisfaction	Geriatric Depression Scale (South Korean version)	SNS usage was significantly associated with reduced depression scores in older men, but not in women.
Johansson-Pajala et al., 2023 Sweden	Mixed-methods	$N = 28$ Median age = 74.5 (5.8) 85%	Fik@ room intervention – a web platform for social interaction – conversations in video, voice, or chat on topics of their own choice. There was also a bulletin board.	None	The UCLA Loneliness Scale (Version 3) was used to evaluate the participants' self-reported loneliness.	The results in the UCLA Loneliness Scale showed that experienced loneliness decreased at the 6-week follow-up and increased at the 12-week follow-up but to a lesser extent compared with the loneliness experienced at baseline.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Jung & Sundar, 2022 US	Cross-sectional	N = 202 M = 69.37 (5.88) 79.7%	Number of photo and video posts, comments and replies, number of Facebook friends, and items customized on Facebook profile. Frequency of participants log on to Facebook and time spent on Facebook.	None	Subjective wellbeing was measured by using five items from the Satisfaction with Life Scale (SWLS).	Frequent posting of photos provides a feeling a competence, which in turn is associated with subjective wellbeing.
Larsson *et al.*, 2016 Sweden	Interventional	N = 30 M = 71.2 80%	Individual and group meetings, in-home and remote support encouraging use of Facebook, Skype, and online forum.	Participants were randomized	UCLA Loneliness Scale	The intervention significantly reduced loneliness and improved satisfaction with social contacts online.
Lau *et al.*, 2016 Hong Kong (China)	Cross-Sectional	N = 213 65 +	Social resource loss on social media	Sociodemographic variables and general social resource loss	State-Trait Anxiety Inventory, Patient Health Questionnaire	Social resource loss on social media was related to depressive symptoms among older adults but not anxiety symptoms 2 months after the conclusion of the Umbrella Movement.
Lewin *et al.*, 2023 US	Cross-sectional	N = 862 M = 73.1 (7.0) 60%	Frequency of using various active and passive activities on Facebook	Demographic characteristics	Depressive symptoms were assessed with PHQ-2.	Active SMU was associated with an increased likelihood for high depressive symptoms, and passive SMU was significantly associated with a decreased likelihood of high depressive symptoms.
Lin *et al.*, 2020 Canada	Cross-Sectional	N = 12,387 66–85	Frequency of using social networking sites.	Social support and refugee status	Center for Epidemiological Studies Short Depression	More frequent use of SNSs was associated with less chance of becoming depressed which was mediated by social support.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Morton et al., 2018 UK	Interventional	N = 76 M = 80.71 (8.77) 50%	Hardware and customized computer platform with a simplified touchscreen interface. Three months training in use of computers as social tools.	Participants were randomly assigned to either a training or care-as-usual control group	General Health Questionnaire, Center for Epidemiologic Studies' Depression Scale, Geriatric Anxiety Inventory, Satisfaction with Life Scale, and UCLA Loneliness Scale.	The intervention indirectly reduced depression, anxiety, and improved general mental health and satisfaction with life via increased competence and personal identity strength, but direct effects of training on these mental health outcomes were not observed.
Mu et al., 2023 China	Cross-sectional	N = 3171 M = 68 (5.8) 48.3%	Dichotomous variable. "Do you watch short-form videos" and "Do you use WeChat?" in the past week.	Sociodemographic variables and health status	Depressive symptoms: the eight-item Center for Epidemiologic Studies Depression Scale (CES-D)	Watching short-form videos was associated with higher depressive symptoms, and using WeChat was associated with lower depressive symptoms.
Nakagomi et al., 2022 Japan	Observational longitudinal	N = 9199 M = 71.0 (4.7) 61.8%	Participants reported their purpose of using internet including social use (communication with friends/family and social media)	Demographic factors, physical health conditions, socioeconomic status, and physical social interaction at baseline as potential confounders	Depressive symptoms were assessed by the short form of the Geriatric Depression Scale (GDS)	Internet use for communication has a protective influence on the probability of developing clinical depression. However, other purposes of internet use showed no protective association with developing clinical depression.
Nam, 2021 South Korea	Cross-sectional	N = 15,000 65 + 54.9%	The use of social media during the previous month was assessed as 1 (used) or 0 (not used), including all types of social media.	None	Quality of Life Scale, social support was assessed using The Multidimensional Scale of Perceived Social Support.	Use of social media had not only a direct effect on quality of life but also an indirect effect through social support.
Nimrod, 2020 Israel	Cross-Sectional	N = 407 M = 69.14 (5.14) 49.4%	Changes in different functions of internet use following the onset of the COVID-19 pandemic.	Sex, age, marital status, number of children, education, income, employment status, place of residence, place of birth, and self-rated health	Subjective wellbeing was measure with the Satisfaction with Life Scale.	No significant associations between subjective wellbeing and more internet use for communication were found.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Quinn, 2021 US	Interventional	$N = 36$, $M = 76.8$, 69.4%	Six training workshops were conducted helping participants learn how to use Facebook and Twitter.	Randomized, wait list control design	UCLA Loneliness Scale, the Social Connectedness Scale.	No significant difference was found between groups in loneliness. Both groups experienced significant decreases in perceived loneliness over the study period potentially explained by participation in the study. No significant effect was found on social connectedness either.
Rolandi *et al.*, 2020 Italy	Interventional	$N = 130$ ($n_{trained} = 60$ $n_{untrained} = 70$) $M = 81.8$ (1.4) 52%	Five interactive group sessions held twice a week covering smartphone use, Facebook and WhatsApp use.	Baseline social engagement	UCLA Loneliness Scale, Lubben Social Network Scale	No significant differences in loneliness and social engagement were found between trained and untrained groups; however, there was confounding factor, that is, a portion of participants in the untrained group reported being SNSs users during the lockdown period.
Sakurai *et al.*, 2021 Japan	Cross-Sectional	$N = 2985$ $M = 74.7$ 54.7%	Frequency of using SNSs	Gender, age, education level, living arrangement, presence of chronic disease, subjective health, subjective financial status, frequency of going outdoors, frequency of traditional communication with others, and ability to live independently	WHO-5 for subjective wellbeing and K6 for depression and anxiety feelings of loneliness were measured with a single item: "How often do you feel isolated from the community?"	For older adults, both frequent posting and checking on LINE were independently associated with better wellbeing. No significant associations were found between SNS usage and distress symptoms. Older adults who frequently posted on Twitter were more likely to feel lonely.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Sala et al., 2021 Italy	Cross-sectional	N = 16,925 M = 65 55%	Whether or not performed at least one of the five online communication activities in the last 3 months	Demographic and socioeconomic situations, health conditions (physical and mental), and social network characteristics	Single question measured satisfaction: "How satisfied are you with life overall on a scale from 0 to 10?"	For all age groups, there is a positive and significant association between SM use and life satisfaction that persists even after controlling for control variables (for the age group 65–74 years, the relationship is not statistically significant at standard significance levels). For all age groups, the inclusion of the control variables notably reduced the strength of the relationship between SM use and life satisfaction.
Schwaba et al., 2021 The Netherlands	Observational longitudinal	N = 2922 M = 70.41 (7.18) 50%	Number of hours per week spent on different online activities including social use (e.g. social media, blogging, Skype)	Age, gender, education, subjective health, and mobility	De Jong Gierveld Loneliness Scale, the satisfaction with life scale (SWL), Mental Health Screening Test	Across three ICT clusters (media, instrumental, and social) and three aspects of psychological adjustment (loneliness, SWL, and depressiveness), ICT use and psychological adjustment were generally uncorrelated at baseline and did not change in tandem over the 6-year study period.
Sims et al., 2017 US	Cross-Sectional	N = 445 M = 84 (3)	Number of ICT devices/ applications used	Age, gender, ethnicity, level of education, and urbanicity	Satisfaction with Life Scale, UCLA Loneliness Scale	Overall, using more devices/ applications was associated with higher life satisfaction and lower loneliness. And using ICT to connect with family and friends mediated the relationships between the number of ICT devices and applications used and life satisfaction, and loneliness.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Simons et al., 2023 Netherlands	Cross-sectional	N = 349 M = 74.8 (4.9) 40%	Frequencies of Whatsapp use and use of various internet functions	Gender, age, physical health, relationship, education level, and financial resources.	Loneliness: the 6-item loneliness scale of De Jong Gierveld and Van Tilburg (2006). Bonding social capital: Personal Social Capital Scale for the Elderly.	WhatsApp and internet use were both found positively associated with BSC, while a negative association between WhatsApp use and loneliness was found. SNS use was not associated with BSC nor with loneliness.
Siniscarco et al., 2017 US	Mixed-methods	N = 8 Median age = 85.5 (IQR = 13.25)	Video call with family/friends via Skype at least once a week for approximately 2 months	None	De Jong-Gierveld Emotional Loneliness Scale. Geriatric Depression Scale	No significant effect of the intervention was found on loneliness or depression. Participants frequently indicated that they enjoyed seeing and talking with very close family/friends in the open-ended question.
Szabo et al., 2019 New Zealand	Observational longitudinal	N = 1165 M = 68.22 (4.42) 52.4%	Frequency of social, informational, and instrumental use of internet.	Age, gender, marital status, work status, education, SES, and self-rated health	De Jong Gierveld Loneliness Scale, CASP-12	Social use indirectly impacted wellbeing via decreased loneliness and increased social engagement and was the only predictor of loneliness over time.
Teo et al., 2019 Canada	Observational longitudinal	N = 1424 M = 65 53.1%	Yes/no questions were asked about use of different modalities of computer-mediated communication.	Age, gender, education, race and ethnicity, marital status, and impairment in activities of daily living	Center for Epidemiologic Studies Depression Scale	Social network users did not differ from other modality users in terms of depressive symptoms at 2-year follow-up. Use of video chat (FaceTime and Skype) was associated with lower risk of developing depressive symptoms at 2-year follow-up.
Torp et al., 2008 Norway	Mixed-methods	N = 19, M = 73, 42%	Internet ready computers and three 3-hour course were provided regarding use of an online discussion forum.	None	Mental health: 20-item General Health Questionnaire and focus group interviews.	Nonsignificant increase in stress and mental health problems was reported. Interview data showed positive effect in sense of belonging and emotional support as well as offline network building.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Tsai et al., 2020 Taiwan	Interventional	$N_{control} = 30$ $M_{control} = 69$ 57% $N_{intervention} = 32$ $M_{intervention} = 81$ 75%	The intervention group interacted with their family members once a week for 6 months using a smartphone and LINE application.	Age and frequency of in-person visits, scores for physical role, vitality, and pain, and social function and perceived health	UCLA Loneliness Scale; Geriatric Depression Scale	Compared to control group, intervention group had significant decreases in baseline loneliness scores at 1 months, 3 months, and 6 months. However, changes in mean depression scores did not significantly differ between groups.
Tsai et al., 2011 Taiwan	Interventional	$N_{experimental} = 40$, $N_{comparison} = 50$, $M_{experimental} = 73.82$ (11.19) 55% $M_{comparison} = 79.26$ (7.07) 60%	At least 5 minutes/week for 3 months of videoconference interaction via Skype or MSN with family members in addition to usual family visits, and the comparison group received regular family visits only.	Residents' age and length of residency	Geriatric Depression Scale, UCLA Loneliness Scale	The experimental group had significantly lower mean loneliness and depressive status scores at 3 months, 6 months, and 12 months compared with baseline than those in the comparison group.
Tsai et al., 2010 Taiwan	Interventional	$N_{experimental} = 24$ $M_{experimental} = 74.42$ (10.18) 58.3% $N_{control} = 33$ $M_{control} = 78.48$ (6.75) 57.6%	At least 5 minutes/week for 3 months of videoconference interaction via Skype or MSN with family members in addition to usual family visits, and the comparison group received regular family visits only.	Age and length of residency	Geriatric Depression Scale, UCLA Loneliness Scale	The experimental group had lower mean loneliness scores at 1 week and 3 months after baseline than those in the control group, and lower mean depressive status scores at 3 months after baseline.
Van Boekel et al., 2017 The Netherlands	Cross-Sectional	$N = 1418$ $M = 71.8$ (5.7) 47.18%	Web-based activities were assessed by 17 dichotomous items	None	De Jong Gierveld Loneliness Scale, Mental Health Inventory 5.	Social users did not differ from other clusters on social and emotional loneliness or psychological wellbeing.
Van Ingen et al., 2017 The Netherland	Cross-Sectional	$N = 2032$ (subjective wellbeing) $N = 2162$ (social loneliness) 65 +	Time (hrs/week) spent using SNSs	Functional disability and gender	Subjective wellbeing: "How do you feel at the moment?", De Jong Gierveld loneliness scale	SNS use had no direct effect on changes in subjective wellbeing or on loneliness. However, the more time older individuals spent using SNSs, the smaller the negative effects of functional disability on wellbeing.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Wallinheimo & Evans, 2021 UK	Cross-sectional	$N = 3491$ $M = 67.18$ (5.23) 57%	Which activities did you use the internet in the last 3 months?" Ten options were given including "Making video calls or voice calls (using applications such as Skype, WhatsApp, or FaceTime)"	Age, gender, net household wealth, current employment status, number of people in the household, and education.	Depressive symptoms measured with scale (CES-D) short form (CES-D-SF) and quality of life (QoL) were measured using the 12-item control, autonomy, self-realization, and pleasure scale (CASP-12).	Those who used the internet for communication purposes (video/voice calls) had higher QoL than those who did not. No significant effect on depression.
Woodward et al., 2010 US	Interventional	$N_{experimental} = 45$ $N_{control} = 38$ $M = 71.85$, (7.09) 72%	A 6-month training program covering various computer and internet use topics including social use of instant messaging or Skype.	Randomized control and experimental group	De Jong Gierveld Loneliness Sale, quality of life scale, and Geriatric Depression Scale	No significant difference between the experimental and control groups in loneliness or depressive symptoms was found. The experimental group reported significantly higher quality of life compared to the control group, but there was no significant change over time.
Wu & Chiou, 2020 Taiwan	Cross-Sectional	$N = 153$ $M = 71.56$ (8.46) 62.74%	Use of social media (unfamiliar or familiar)	Age, sex, marital status, education, Religious preference, living arrangement employment, economic status, perceived health comorbidity, medications, sleep quality nap habits, regular exercise, and leisure activities	Chinese version of the Multidimensional Scale of Perceived Social Support and Geriatric Depression Scale.	Those who were familiar with the use of social media received significantly higher social support and use of social media significantly predicted depressive symptoms.
Yang et al., 2021 HongKong (China)	Cross-Sectional	$N = 383$ 65 +	Whether or not and amount of time spent on using SNS in the past 12 months	Sex, age, marital status, education, and income	De Jong Gierveld Loneliness Scale and Center for Epidemiologic Studies Depression Scale	Older adults who spent more time on social media reported less depressive symptoms and lower loneliness.

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Yang et al., 2022 HongKong (China)	Cross-sectional	N = 364 M = 70.0 (7.51) 74.5%.	Frequency and duration of using 14 mobile apps including instant communication (WeChat, WhatsApp, Signal, Line); social media (Facebook, Instagram, Twitter); meeting and conferences (Zoom, MS Teams, Tencent Conference).	Demographic variables	Loneliness: six-item De Jong Gierveld Loneliness Scale, assessing emotional (three items) and social loneliness (three items).	Longer use of instant communication, video entertainment, and information apps was related to less emotional loneliness. More frequent use of a video entertainment mobile app is related to less emotional loneliness. Frequency of using instant communication apps, social media apps, or meeting and conferences apps was not associated with social or emotional loneliness. Duration of using social media apps or meeting and conferences apps was not associated with social or emotional loneliness.
Yang et al., 2021 China	Cross-sectional	N = 221 M > 65 63.8%	Active social media use and passive social media use were measured with three and four items, respectively, including different social media activities.	Loneliness was measured with the three-item short form of the Revised UCLA Loneliness Scale	Life satisfaction and objective social isolation.	Active social media use has a significant effect on online social support, which in turn can form a buffer around seniors' loneliness, whereas upward social comparison cannot mediate the relationship between passive social media use and seniors' loneliness.
Yu et al., 2016 US	Cross-Sectional	N = 1620 M = 65.27 51.50%	Whether or not use Facebook or Twitter.	Demographics, cognitive functioning, self-related health, social network characteristics, and offline social interactions	R-UCLA loneliness scale, perceptions of support from three different sources: children, other immediate family, and friends (measured with customized scale).	SNS use was positively associated with non-kin-related loneliness (i.e. feelings of connectedness), but is not significantly related to kin-related loneliness (i.e. feelings of isolation)

Table 4. Continued

First author name, year, and country	Method	Sample size, mean age (SD) or age range, female%	Social media used or intervention	Variables controlled	Mental health outcome measures	Key findings
Zhang *et al.*, 2021 US	Cross-Sectional	N = 7524, 65 +	Frequency of social media use	Age, educational attainment, gender, marital status, race-ethnic status, household size, wealth, self-rated health, cognition, and depressive symptoms	UCLA Loneliness Scale, customized scale for perceived social support and social contact.	Social media communication was associated with higher perceived social support and social contact, which were related to lower loneliness.
Zhang *et al.*, 2023 US	Cross-sectional	N = 2672 M = 72.1 (9.5) 56.6%	Since the pandemic started, frequency of contacting with non-household (a) family and (b) friends by (i) phone, (ii) messaging (email, text, and social media), (iii) video calls (FaceTime, Skype, and Zoom), and (iv) in-person.	Survey mode, age, gender, race, household size, marital status, educational attainment, employment status, physical health, internet use, and frequency of depressive feelings.	"During the past month, how often have you felt depressed?" Options included rarely or none of the time (1), some of the time (2), occasionally (3), and most of the time (4)."	Older adults with vision impairment and hearing impairment who video called more frequently were less likely to experience depressive feelings related to their sensory impairment. Social media messaging did not have this effect.
Zhou, 2018 China	Cross-Sectional	N = 596 M = 65 + 52%	Knowledge Sharing Behavior Scale (Hsu *et al.*, 2007)	Sex, age, and education	Loneliness, self-efficacy, social support, and life satisfaction (scale names not reported)	SNS use improved life satisfaction by reducing loneliness and improving self-efficacy. Social support alleviated the negative effect of loneliness and enhanced the positive effect of self-efficacy on life satisfaction.

Table 5. Summary of qualitative studies

First author name, year, and country	Sample size, mean age (SD) / age range, female%	Interventions or social media used and data collection method	Key findings
Ballantyne et al., 2010 Australia	N = 6 69–85	All participants were connected to the internet and provided with one-on-one tutoring in how to use a social networking site, About My Age website, an internet intervention used to help reduce loneliness over a 3-month period. The participants' expectations and experience of the project were collected via in-depth interviews at the commencement and completion of the project.	Four major themes arose: the participants' experience of loneliness; technology as an enabler; providing a supportive environment; connectivity. The findings demonstrated that the utilization of a social networking site has the potential to reduce loneliness in older people, specifically temporal loneliness, but also loneliness as connectedness.
Hemberg & Santamäki, 2018 Finland	N = 7, M = 85 +, 71.4%	Specially developed elderly friendly touchscreen displays with video cameras and broadband connection were installed in participants' homes. By only pushing 1 or 2 buttons to immediately come in contact and be able see, hear, and communicate with one or many of the participants from the intervention program who were online at that moment. Interviews with older adults regarding their views and experiences of living at home and using real video communication for being in contact with other persons.	Participants expressed positive impact of the intervention on their wellbeing. Three main themes emerged: alleviating suffering through beating involuntary solitude, being in the world as an equal and dignified human being, dedicating new perspectives, and meaning in life.
Hong et al., 2021 China	N = 19, M = 73.84, 63.16%	Interviews were conducted with the 19 widowed older adults probing their online social participation including social media use.	Two major themes, benefits and barriers were identified. Benefits include convenience, flexible time, social supplementation, health promotion, emotional comfort, and social connection. Barriers were worries for personal economic loss, concerns of security of digital device, troubles of the diversity of online social participation, and difficulties in using digital media. Social networking can facilitate contacts with relatives and friends and relieve loneliness.
Jarvis et al., 2019 South Africa	N = 13 Age range = 65–87, 86.4%	Ninety-minute training in the use of a smartphone and WhatsApp was provided for participants twice a week over a fortnight, focusing on developing technological readiness in the use of smartphones and WhatsApp. Data were collected through focus group discussion and social media data.	Content analysis revealed that the intervention reduced loneliness through four main avenues: strengthening existing social ties, facilitating the development of new social networks, promoting cognitive flexibility, and enhancing self-efficacy and self-confidence.

Table 5. Continued

First author name, year, and country	Sample size, mean age (SD) / age range, female%	Interventions or social media used and data collection method	Key findings
Judges et al., 2017 Canada	N = 10, M = 80.6 70%	Intervention involved the use of InTouch, an accessible software application (running on iPads) that has a non-language-specific interface and supports asynchronous communication which allows older adults to send and receive short, preset text messages; video messages; audio messages; photo within a closed network. Data were collected via interviews and field notes at three phases of the study.	Participants conveyed mixed feelings while using InTouch. For some participants, the intervention enhanced the frequency and quality of communication with families and friends and enhanced the self-efficacy for computer-naive seniors to use information technology. Those who were successfully adopted the tool reported more positive feelings than those who did not adopt it.
Pera et al., 2020 Italy	N = 16, M = 65 +	In-depth interviews were conducted probing participants photo sharing experience on social media (mainly Facebook and WhatsApp)	Subjective wellbeing in older consumers is positively influenced by photo-sharing through social media. Photo-sharing positively influences the dimensions of self-acceptance, positive relationship with others, autonomy, environmental mastery, purpose in life, and personal growth, thereby enhancing subjective wellbeing as a whole.
Yachin & Nimrod, 2021 Multi-sites	N = 184, M = 71.2 100%	Group discussion probed participants' experiences of ICT use including the process by which they learned to use various ICTs; use of different devices, software, and applications; and examining the difficulties faced and the benefits derived.	Participants discussed the advantages (such as maintaining and improving relationships with family members and friends, strengthening connection to personal roots, maintaining feeling of being part of the world and providing a sense of relevance) of Facebook use but also pointed out numerous negative aspects (such as operating difficulties and unappealing content).

study designs, outcome variables examined, the way in which social media use was measured and the confounding variables that were controlled for in analyses. Despite the variation in findings, there was some consistency to suggest social media use was associated with better outcomes in cross-sectional, interventional, and qualitative studies, but findings were mixed in longitudinal study designs.

Most of the cross-sectional studies revealed that social media use was associated with lower levels of loneliness and fewer depressive symptoms, higher life satisfaction, and higher quality of life. While causal conclusions cannot be drawn from studies using cross-sectional methods, it is possible that frequent social media use maintains good psychosocial wellbeing by facilitating and supporting access to social interactions. However, this association might also occur if poorer mental health is associated with reduced use of social media. For example, people with depression are likely to socially withdraw in person, and this may also include avoiding or withdrawing from socially engaging online. Several cross-sectional studies reported that older adults' social media use was unrelated to psychosocial outcomes, suggesting that the associations may be context-dependent. Demographic variables including age, nationality, education, health condition, etc., and factors such as technology familiarity, access to devices, privacy concerns, financial constraints, and internet reliability (such as in rural/remote areas) may all influence older people's use of social media and its impact. Moreover, specific social media functions, such as video conferencing or chat, may have greater impact on psychosocial outcomes than other social media functions. Further research is required to explore these associations, particularly through designs that enable causal conclusions such as longitudinal and randomized controlled trial (RCT) studies.

Only a small number of studies utilized longitudinal study designs, and across these studies mixed results were found. In general, the longitudinal studies reported mixed findings on loneliness and depression with some reporting that social media use led to decreased loneliness and depression over time, while some studies found no significant effect on depression or loneliness over time. Studies reported no significant effects of social media use over time on life satisfaction or relatedness. Outcomes for anxiety are unknown, and further research is needed to examine the impact on anxiety and socially relevant subtypes such as social anxiety, as well as to explore whether particular components of social media use are more likely to be associated with changes in symptoms over time.

Most interestingly, the interventional studies predominantly showed positive effects of increased social media use on psychosocial outcomes. Social media-related interventions were mostly shown to lead to reduced depression and anxiety, and increased life satisfaction over time. Interestingly, interventions designed to target loneliness were associated with mixed findings. Notably, social media interventions that encouraged communication with family and friends specifically, as opposed to people in general, were associated with positive mental health outcomes (Nakagomi *et al.*, 2022; Szabo *et al.*, 2019). Further, there was some evidence across studies that interventions focused on using video chat/video conferencing (also especially with family members) were more effective in relieving older adults' loneliness and depressive symptoms than other functions of social media (Teo *et al.*, 2019, Tsai *et al.*, 2010; Tsai & Tsai, 2011; Tsai *et al.*, 2020). It is not clear whether the communication format or the encouragement to communicate with family members was more effective in improving psychosocial outcomes. If it is the format, this suggests that social media communication that more closely mimics face-to-face interaction (such as video conferencing) might be of particular importance. Alternatively, increased contact with family members may have led to the positive psychosocial outcomes, which is consistent with previous studies showing that older adults prefer smaller online social networks comprised of their family and friends (Rylands & Van Belle, 2017; Sims *et al.*, 2017). Given only a small number of longitudinal and interventional studies were identified, more studies are needed to tease apart these potential social media components so that further interventions can be developed to improve psychosocial outcomes in later life.

Participants in qualitative studies generally reported positive experiences of social media use or interventions. Again, while no causal conclusions can be drawn from these studies, the results demonstrate the reasons some older adults are inclined to use or not use social media regularly. Three of the four mixed-methods studies did not show any significant benefit in psychosocial outcomes in the quantitative evaluations of the interventions used. As these studies all had very small samples, the results may be biased by sampling variability and not generalizable.

In the 11 studies that investigated mediators of the relationship between social media use and psychosocial outcomes, 9 studies found that social support and social contact/engagement mediated the associations between social media use and

loneliness, depressive symptoms, quality of life, and life satisfaction. Indeed, social support plays a central role in enhancing psychosocial outcomes among diverse age groups and populations, serving as an intermediary element in the connection between loneliness and a range of health consequences, such as depression, anxiety, physical symptoms, and overall psychological wellness (Chen *et al.*, 2014; Harandi *et al.*, 2017; Hutten *et al.*, 2021; Liu *et al.*, 2016; Wan Mohd Azam *et al.*, 2013; Werner-Seidler *et al.*, 2017). It is possible that social media use or interventions help older adults maintain and improve social contact and engagement, which facilitates their access to social support and reduces their social isolation which in turn reduces depression and improves psychosocial wellbeing or life satisfaction. Two of the included studies showed feeling of competence mediated the relationship between social media use and loneliness and wellbeing. According to Self-Determination Theory (Ryan & Deci, 2017), experiencing competence through successful challenges and tasks boosts self-esteem and wellbeing, fostering intrinsic motivation linked to positive mental health outcomes. It is possible that social media use increases self-efficacy/confidence, leading to increased confidence in initiating or positively responding to social contact and social support, thereby reducing older adults' depression and improving their wellbeing. Future research should test these potential pathways to gain a deeper understanding of how social media use improve psychosocial outcomes in older adults.

The diversity within the literature and studies considered in this review complicates the synthesis of clear conclusions. Studies reviewed exhibit variation across multiple dimensions, including definitions of social media and how its use was assessed, the outcomes measured, and measurement tools used, the research methodologies employed, the characteristics of the study participants, and the variables controlled for that could influence the results. A primary source of this heterogeneity arises from the wide-ranging approaches to measure the exposure, involving choices regarding which social media platforms were examined, the user status of participants, the frequency of social media usage, the number of different online applications used, the amount of time spent on social media, and the frequency of engaging in specific social media functions. For example, in the study by Simons *et al.* (2023), the use of WhatsApp was linked to reduced loneliness, while the use of SNSs was not. The authors made a distinction between WhatsApp and SNSs whereas many other studies classified WhatsApp within the category of SNSs (e.g. Gaia *et al.*, 2021). This multiplicity of measurement approaches poses challenges in drawing generalizable

conclusions, as the consequences of employing different platforms and usage patterns may substantially differ. The multitude of assessed outcomes, including loneliness, depression, anxiety, life satisfaction, quality of life, and social connectedness, further adds to the complexity. Given the overlapping variance between emotional symptoms such as depression, anxiety, and loneliness, without controlling for each of these constructs, it is difficult to differentiate the effects on individual symptoms conclusively. Further, the mechanisms through which engagement with social media affects these outcomes can substantially vary. For instance, when considering the connection between social media usage and loneliness, factors such as the quality of online social interactions, perceived social support, and the extent of offline social engagement may play distinctive roles. In contrast, when examining the link between social media engagement and anxiety, the mediating factor might involve one's sense of competence.

Clear findings are elusive due to variations in exposure, outcome measures, methodology, sample characteristics, confounding variables, measurement instruments, and methodological limitations. Addressing this heterogeneity through standardized approaches (such as greater standardization in measuring social media exposure, outcome variables, and methodology) and more rigorous research (e.g. using more longitudinal and RCT studies to explore causal pathways and inform the development of interventions that promote positive outcomes and mitigate negative ones) can help advance our understanding of the complex relationships between social media use and psychosocial outcomes in older adults.

Limitations

First, in general, most of the studies relied on self-reported data to assess participants' social media use and mental health outcomes which could lead to biased results. Future studies may gain advantages from utilizing SNSs data in real time and longitudinally. Second, most of the included studies were cross-sectional, preventing causal inference. Third, participants in qualitative studies may over-report positive experiences due to social desirability bias or social acceptability bias. Fourth, in interventional studies, interventions often involve face-to-face and/or online socialization between participants and/or between participants and trainers (e.g. Ballantyne *et al.*, 2010), which may obscure the origin of the effect on the dependent variables. Fifth, few studies controlled for general internet use, intelligence, network size, or computer confidence

which may all be relevant confounds to consider. Additionally, the search was conducted across three databases, in one language, and search terms focused on Western social media platforms, which may have potentially limited the number of studies identified.

Conclusion and implications

This review examined studies using a wide range of study designs investigating the effect of social media use on older adults' psychosocial outcomes. Although the findings were mixed, there was some evidence that social media use has the potential to improve older adults' psychosocial outcomes. Insights from this systematic review may benefit practitioners in understanding the common benefits and challenges associated with social media use in older adults. That is, social media use has mixed benefits for older adults' psychosocial outcomes, with some evidence that frequent social media use that increases community and family engagement and a sense of social support and belonging are the key targets for maintaining psychosocial wellbeing in later life. More longitudinal and interventional studies with adequate methodological rigor are needed to confirm this trend and to identify the factors that prevent some older adults from benefiting from social media use to inform policy for improving the life quality of older people.

Conflicts of interest

None.

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Description of author(s)' roles

Xiaojing Lei, Diana Matovic, and Viviana Wuthrich designed the search strategy and prepared the manuscript. Xiaojing Lei, Diana Matovic, Wing-Yin Leung, and Abhirami Viju screened and evaluated the studies, extracted data, and completed quality assessments. Xiaojing Lei conducted the database search, removed duplicates, and synthesized the results.

Supplementary material

For supplementary material accompanying this paper visit https://doi.org/10.1017/S1041610223004519

References

Aarts, S., Peek, S. T. M., & Wouters, E. J. M. (2015). The relation between social network site usage and loneliness and mental health in community-dwelling older adults. *International Journal of Geriatric Psychiatry*, 30(9), 942–949. https://doi.org/10.1002/gps.4241

Akiboye, F., Sihre, H. K., Al Mulhem, M., Rayman, G., Nirantharakumar, K., & Adderley, N. J. (2021). Impact of diabetes specialist nurses on inpatient care: A systematic review. *Diabetic Medicine*, 38(9), e14573–n/a. https://doi.org/10.1111/dme.14573

Anderson, M., Perrin, A., Jiang, J., & Kumar, M. (2019). *10% of Americans don't use the Internet. Who are they?*, Pew Research Center.

Ang, S., Chen, T.-Y., & Carr, D. (2019). Going online to stay connected: Online social participation buffers the relationship between pain and depression. *The Journals of Gerontology. Series B, Psychological sciences and social sciences*, 74(6), 1020–1031. https://doi.org/10.1093/geronb/gby109

Awata, S., Bech, P., Koizumi, Y., Seki, T., Kuriyama, S., Hozawa, A., Ohmori, K., Nakaya, N., Matsuoka, H., & Tsuji, I. (2007). Validity and utility of the Japanese version of the WHO-five well-being index in the context of detecting suicidal ideation in elderly community residents. *International Psychogeriatrics*, 19(01), 77–88. https://doi.org/10.1017/S1041610206004212

Bagias, C., Sukumar, N., Weldeselassie, Y., Oyebode, O., & Saravanan, P. (2021). Cord blood adipocytokines and body composition in early childhood: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18(4), 1897–. https://doi.org/10.3390/ijerph18041897

Baker, S., Warburton, J., Waycott, J., Batchelor, F., Hoang, T., Dow, B., Ozanne, E., & Vetere, F. (2018). Combatting social isolation and increasing social participation of older adults through the use of technology: A systematic review of existing evidence. *Australasian Journal on Ageing*, 37(3), 184–193. https://doi.org/10.1111/ajag.12572

Ballantyne, A., Trenwith, L., Zubrinich, S., & Corlis, M. (2010). 'I feel less lonely': What older people say about participating in a social networking website. *Quality in Ageing*, 11(3), 25–35. https://doi.org/10.5042/qiaoa.2010.0526

Baltes, P. B., & Baltes, M. M. (1990). Psychological perspectives on successful aging: The model of selective optimization with compensation. In P. B. Baltes, & M. M. Baltes (Eds.), *Successful aging: Perspectives from the behavioral sciences* (pp. 1–34). Cambridge University Press.

Barbosa Neves, B., Franz, R., Judges, R., Beermann, C., & Baecker, R. (2019). Can digital technology enhance social connectedness among older adults? A feasibility study. *Journal of Applied Gerontology*, 38(1), 49–72. https://doi.org/10.1177/0733464817741369

Beam, C. R., Kim, A., & J (2020). Psychological sequelae of social isolation and loneliness might be a larger problem in young adults than older adults. *Psychological Trauma: Theory, Research, Practice, and Policy*, 12(S1), S58–S60. https://doi.org/10.1037/tra0000774

Beck, A. T., Epstein, N., Brown, G., & Steer, R. A. (1988). An inventory for measuring clinical anxiety: psychometric properties. *Journal of Consulting and Clinical Psychology*, 56(6), 893–897.

Bertić, Ž., & Telebuh, M. (2020). Self-assessment of social and family loneliness in elderly during COVID-19 pandemic in relation to current level and type of communication intensity. *Collegium Antropologicum*, 44(4), 209–217. https://doi.org/10.5671/ca.44.4.3

Berwick, D. M., Murphy, J. M., Goldman, P. A., Ware, J. E., Barsky, A. J., & Weinstein, M. C. (1991). Performance of a five-item mental health screening test. *Medical Care*, 29(2), 169–176. https://doi.org/10.1097/00005650-199102000-00008

Byrne, G. J., & Pachana, N. A. (2011). Development and validation of a short form of the geriatric anxiety inventory—The GAI-SF. *International Psychogeriatrics*, 23(1), 125–131.

Byrne, K. A., Anaraky, R. G., Dye, C., Ross, L. A., Chalil Madathil, K., Knijnenburg, B., & Levkoff, S. (2021). Examining rural and racial disparities in the relationship between loneliness and social technology use among older adults. *Frontiers in Public Health*, 9, 723925–723925. https://doi.org/10.3389/fpubh.2021.723925

Casanova, G., Zaccaria, D., Rolandi, E., & Guaita, A. (2021). The effect of information and communication technology and social networking site use on older people's well- being in relation to loneliness. *Review of Experimental Studies. Journal of Medical Internet Research*, 23(3), e23588–e23588. https://doi.org/10.2196/23588

Challands, K. G., Lacherez, P., & Obst, P. L. (2017). Does online social connectedness buffer risk of depression following driving cessation? An analysis of older drivers and ex- drivers. *Cyberpsychology, Behavior and Social Networking*, 20(4), 232–237. https://doi.org/10.1089/cyber.2016.0377

Chen, W., & Miao, J. (2023). Does the internet moderate the neighborhood effect? internet use, neighborhoods, and mental health among older adults in Shanghai. *International Journal of Environmental Research and Public Health*, 20(3), 2267–. https://doi.org/10.3390/ijerph20032267

Chen, Y., Hicks, A., & While, A. E. (2014). Loneliness and social support of older people in China: A systematic literature review. *Health & social care in the community*, 22(2), 113–123.

Chen, Y. R. R., & Schulz, P. J. (2016). The effect of information communication technology interventions on reducing social isolation in the elderly: A systematic review. *Journal of Medical Internet Research*, 18(1), e18–e18. https://doi.org/10.2196/jmir.4596

Chiarelli, T. M., & Batistoni, S. S. T. (2021). An analysis of socioemotional selectivity theory in the context of older adults' use of facebook. *Educational Gerontology*, 47(1), 13–24. https://doi.org/10.1080/03601277.2020.1849956

Chopik, W. J. (2016). The benefits of social technology use among older adults are mediated by reduced loneliness. *Cyberpsychology, Behavior and Social Networking*, 19(9), 551–556. https://doi.org/10.1089/cyber.2016.0151

Clark, R., & Moloney, G. (2020). Facebook and older adults: Fulfilling psychological needs? *Journal of Aging Studies*, 55, 100897. https://doi.org/10.1016/j.jaging.2020.100897

Cornwell, E. Y., & Waite, L. J. (2009). Social disconnectedness, perceived isolation, and health among older adults. *Journal of Health and Social Behavior*, 50(1), 31e48–48. https://doi.org/10.1177/002214650905000103

Coyle, C., & Dugan, E. (2012). Social isolation, loneliness and health among older adults. *Journal of Aging and Health*, 24(8), 1346–1363. https://doi.org/10.1177/0898264312460275

de Jong Gierveld, J., & van Tilburg, T. (2006). A 6-item scale for overall, emotional and social loneliness: Confirmatory tests on survey data. *Research on Aging*, 28(5), 582–598. https://doi.org/10.1177/0164027506289723

Dhakal, U., Koumoutzis, A., & Vivoda, J. M. (2023). Better together: Social contact and loneliness among u.s. older adults during COVID-19. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 78(2), 359–369. https://doi.org/10.1093/geronb/gbac136

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

DiTommaso, E., & Spinner, B. (1993). The development and initial validation of the social and emotional loneliness scale for adults (SELSA). *Personality and Individual Differences*, 14, 127–134. https://doi.org/10.1016/0191-

Erfani, S. S., & Abedin, B. (2018). Impacts of the use of social network sites on users psychological well-being: A systematic review. *Journal of the Association for Information Science and Technology*, 69(7), 900–912. https://doi.org/10.1002/asi.24015

Flanagan, J. C. (1978). A research approach to improving our quality of life. *The American Psychologist*, 33(2), 138–147. https://doi.org/10.1037/0003-066X.33.2.138

Francis, J. (2022). Elder orphans on facebook: Implications for mattering and social isolation. *Computers in Human Behavior*, 127, 107023–. https://doi.org/10.1016/j.chb.2021.107023

Fuss, B. G., Dorstyn, D., & Ward, L. (2019). Computer-mediated communication and social support among community-dwelling older adults: A systematic review of cross-sectional data. *Australasian Journal on Ageing*, 38(4), e103–e113. https://doi.org/10.1111/ajag.12703

Gaia, A., Sala, E., & Cerati, G. (2021). Social networking sites use and life satisfaction. A quantitative study on older people living in Europe. *European Societies*, 23(1), 98–118. https://doi.org/10.1080/14616696.2020.1762910

Hage, E., Wortmann, H., van Offenbeek, M., & Boonstra, A. (2016). The dual impact of online communication on older adults' social connectivity. *Information Technology & People*, 29, 31–50. https://doi.org/10.1108/itp-09-2014-0216

Hajek, A., & König, H. (2022). Frequency of contact with friends and relatives via internet and psychosocial factors in middle-aged and older adults during the COVID-19

pandemic. Findings from the German ageing survey. *International Journal of Geriatric Psychiatry*, 37(1), 1–10. https://doi.org/10.1002/gps.5623

Harandi, T. F., Taghinasab, M. M., & Nayeri, T. D. (2017). The correlation of social support with mental health: A meta-analysis. *Electronic Physician*, 9(9), 5212–5222. https://doi.org/10.19082/5212

Haslam, C., Cruwys, T., Milne, M., Kan, C.-H., & Haslam, S. A. (2016). Group ties protect cognitive health by promoting social identification and social support. *Journal of Aging and Health*, 28(2), 244–266. https://doi.org/10.1177/0898264315589578

Heikkinen, R. L., & Kauppinen, M. (2004). Depressive symptoms in late life: A 10-year follow-up. *Archives of Gerontology and Geriatrics*, 38(3), 239–250.

Hemberg, J., & Santamäki Fischer, R. (2018). A window toward the world: Older adults' experiences of becoming in health and developing as human beings through interacting with others using real video communication. *Holistic Nursing Practice*, 32(2), 90–97. https://doi.org/10.1097/HNP.0000000000000254

Hofer, M., & Hargittai, E. (2021). Online social engagement, depression, and anxiety among older adults. *New Media & Society*, 26(1), 146144482110543–. https://doi.org/10.1177/14614448211054377

Hong, Y., Fu, J., Kong, D., Liu, S., Zhong, Z., Tan, J., & Luo, Y. (2021). Benefits and barriers: A qualitative study on online social participation among widowed older adults in Southwest China. *BMC geriatrics*, 21(1), 450–450. https://doi.org/10.1186/s12877-021-02381-w

Hsu, M. H., Ju, T. L., Yen, C. H., & Chang, C. M. (2007). Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations. *International Journal of Human-Computer Studies*, 65(2), 153–169.

Huang, C. (2017). Time spent on social network sites and psychological well-being: a meta-analysis, cyberpsychology. *Behavior and Social Networking*, 20(6), 346–354. https://doi.org/10.1089/cyber.2016.0758

Hutten, E., Jongen, E. M., Vos, A. E., van den Hout, A. J., & van Lankveld, J. J. (2021). Loneliness and mental health: The mediating effect of perceived social support. *International journal of environmental research and public health*, 18(22), 11963.

Hutto, C. J., Bell, C., Farmer, S., Fausset, C., Harley, L., Nguyen, J., Fain, B., Xu, Y., & Pasi, G. (2015). Social media gerontology: Understanding social media usage among older adults. *Web Intelligence*, 13(1), 69–87. https://doi.org/10.3233/WEB-150310

Hwang, J., Toma, C. L., Chen, J., Shah, D. V., Gustafson, D., & Mares, M. L. (2021). Effects of web-based social connectedness on older adults' depressive symptoms: A two-wave cross-lagged panel study. *Journal of Medical Internet Research*, 23(1), e21275–e21275. https://doi.org/10.2196/21275

Jarvis, M. A., Chipps, J., & Padmanabhanunni, A. (2019). This phone saved my life: Older persons' experiences and appraisals of an mHealth intervention aimed at addressing loneliness. *Journal of Psychology in Africa*, 29(2), 159–166. https://doi.org/10.1080/14330237.2019.1594650

Jeon, G. S., Choi, K. W., & Jang, K. S. (2020). Social networking site usage and its' impact on depressive symptoms among older men and women in South Korea. *International Journal of Environmental Research and Public Health*, 17(8), 2670. https://doi.org/10.3390/ijerph17082670

Johansson-Pajala, R. M., Gusdal, A., Eklund, C., Florin, U., & Wågert, P.von H. (2023). A codesigned web platform for reducing social isolation and loneliness in older people: A feasibility study. *Informatics for Health & Social Care*, 48(2), 109–124. https://doi.org/10.1080/17538157.2022.2070068

Judges, R. A., Laanemets, C., Stern, A., & Baecker, R. M. (2017). InTouch" with seniors: Exploring adoption of a simplified interface for social communication and related socioemotional outcomes. *Computers in Human Behavior*, 75, 912–921. https://doi.org/10.1016/j.chb.2017.07.004

Jung, E. H., & Sundar, S. S. (2022). Older adults' activities on facebook: Can affordances predict intrinsic motivation and well-being? *Health Communication*, 37(5), 597–607. https://doi.org/10.1080/10410236.2020.1859722

Keles, B., McCrae, N., & Grealish, A. (2020). A systematic review: The influence of social media on depression, anxiety and psychological distress in adolescents. *International Journal of Adolescence and Youth*, 25(1), 79–93. https://doi.org/10.1080/02673843.2019.1590851

Khosravi, P., Rezvani, A., & Wiewiora, A. (2016). The impact of technology on older adults' social isolation. *Computers in Human Behavior*, 63, 594–603. https://doi.org/10.1016/j.chb.2016.05.092

Kim, C., & Shen, C. (2020). Connecting activities on social network sites and life satisfaction: A comparison of older and younger users. *Computers in Human Behavior*, 105, 106222–. https://doi.org/10.1016/j.chb.2019.106222

Kleppang, A.L., & Hagquist, C. (2016). The psychometric properties of the Hopkins Symptom Checklist-10: A Rasch analysis based on adolescent data from Norway. *Family Practice*, 33, 740–745. https://doi.org/10.1093/fampra/cmw091

Larsson, E., Padyab, M., Larsson-Lund, M., & Nilsson, I. (2016). Effects of a social internet- based intervention programme for older adults: An explorative randomised crossover study. *The British Journal of Occupational Therapy*, 79(10), 629–636. https://doi.org/10.1177/0308022616641701

Lau, K. M., Hou, W. K., Hall, B. J., Canetti, D., Ng, S. M., Lam, A. I. F., & Hobfoll, S. E. (2016). Social media and mental health in democracy movement in Hong Kong: A population-based study. *Computers in Human Behavior*, 64, 656–662. https://doi.org/10.1016/j.chb.2016.07.028

Lee, R. M., Draper, M., & Lee, S. (2001). Social connectedness, dysfunctional interpersonal behaviors, and psychological distress: Testing a mediator model. *Journal of Counseling Psychology*, 48(3), 310–318. https://doi.org/10.1037/0022-0167.48.3.310

Lewin, K. M., Meshi, D., Schuster, A. M., & Cotten, S. R. (2023). Active and passive social media use are differentially related to depressive symptoms in older adults. *Aging & Mental Health*, 27(1), 176–183. https://doi.org/10.1080/13607863.2022.2068133

Lin, S., Kobayashi, K., Tong, H., Davison, K. M., Arora, S. R. A., & Fuller-Thomson, E. (2020). Close relations matter: the association between depression and refugee status in the Canadian longitudinal study on aging (CLSA). *Journal of Immigrant and Minority Health*, 22(5), 946–956. https://doi.org/10.1007/s10903-020-00980-0

Liu, L., Gou, Z., & Zuo, J. (2016). Social support mediates loneliness and depression in elderly people. *Journal of health psychology*, 21(5), 750–758.

Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., Brayne, C., Burns, A., Cohen-Mansfield, J., Cooper, C., Costafreda, S. G., Dias, A., Fox, N., Gitlin, L. N., Howard, R., Kales, H. C., Kivimäki, M., Larson, E. B., Ogunniyi, A., Orgeta, V., Ritchie, K., Rockwood, K., Sampson, E. L., Samus, Q., Schneider, L. S., Selbæk, G., Teri, L., & Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of the lancet commission. *The Lancet*, 396(10248), 413–446. https://doi.org/10.1016/S0140-6736(20)30367-6

Marteau, T. M., & Bekker, H. (2020). The development of a six-item short-form of the state scale of the spielberger state-trait anxiety inventory (STAI) (vol 31, pg 301, 1992). *British Journal of Clinical Psychology*, 59(2), 276–276. https://doi.org/10.1111/bjc.12243

Morton, T. A., Wilson, N., Haslam, C., Birney, M., Kingston, R., & McCloskey, L. G. (2018). Activating and guiding the engagement of seniors with online social networking: experimental findings from the AGES 2.0 project. *Journal of Aging and Health*, 30(1), 27–51. https://doi.org/10.1177/0898264316664440

Mu, A., Yuan, S., & Liu, Z. (2023). Internet use and depressive symptoms among chinese older adults: Two sides of internet use. *Frontiers in Public Health*, 11, 1149872–1149872. https://doi.org/10.3389/fpubh.2023.1149872

Nakagomi, A., Shiba, K., Kondo, K., & Kawachi, I. (2022). Can online communication prevent depression among older people? A longitudinal analysis. *Journal of Applied Gerontology*, 41(1), 167–175. https://doi.org/10.1177/0733464820982147

Nam, S. J. (2021). Mediating effect of social support on the relationship between older adults' use of social media and their quality-of-life. *Current Psychology (New Brunswick, N.J.)*, 40(9), 4590–4598. https://doi.org/10.1007/s12144-019-00399-3

Nesi, J. (2020). The impact of social media on youth mental health: Challenges and opportunities. *North Carolina Medical Journal (Durham, N.C.)*, 81(2), 116–121. https://doi.org/10.18043/ncm.81.2.116

Nimrod, G. (2020). Changes in internet use when coping with stress: Older adults during the covid-19 pandemic. *The American Journal of Geriatric Psychiatry*, 28(10), 1020–1024. https://doi.org/10.1016/j.jagp.2020.07.010

Noone, C., McSharry, J., Smalle, M., Burns, A., Dwan, K., Devane, D., Morrissey, E. C., & Cochrane Public Health Group (2020). Video calls for reducing social isolation and loneliness in older people: A rapid review. *Cochrane Database of Systematic Reviews*, 5(7), CD013632–CD013632. https://doi.org/10.1002/14651858.CD013632

O'Day, E. B., & Heimberg, R. G. (2021). Social media use, social anxiety, and loneliness: A systematic review.

Computers in Human Behavior Reports, 3, 100070–. https://doi.org/10.1016/j.chbr.2021.100070

Obar, J. A., & Wildman, S. (2015). Social media definition and the governance challenge: An introduction to the special issue. *Telecommunications Policy*, 39(9), 745–750.

Ortiz-Ospina, E. (2019). "The rise of social media", *OurWorldInData.org*. https://ourworldindata.org/rise-of-social-media. Accessed October 29, 2023

Patterson, A. C., & Veenstra, G. (2010). Loneliness and risk of mortality: A longitudinal investigation in Alameda County, California. *Social Science & Medicine*, 71(1), 181–186.

Pera, R., Quinton, S., & Baima, G. (2020). I am who I am: Sharing photos on social media by older consumers and its influence on subjective well-being. *Psychology & Marketing*, 37(6), 782–795. https://doi.org/10.1002/mar.21337

Quinn, K. (2018). Cognitive effects of social media use: A case of older adults. *Social media + Society*, 4(3), 205630511878720. https://doi.org/10.1177/2056305118787203

Quinn, K. (2021). Social media and social wellbeing in later life. *Ageing and Society*, 41(6), 1349–1370. https://doi.org/10.1017/S0144686X19001570

Radloff, L.S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1, 385–401 [online]. https://doi.org/10.1177/014662167700100306

Rolandi, E., Vaccaro, R., Abbondanza, S., Casanova, G., Pettinato, L., Colombo, M., & Guaita, A. (2020). Loneliness and social engagement in older adults based in lombardy during the covid-19 lockdown: The long-term effects of a course on social networking sites use. *International Journal of Environmental Research and Public Health*, 17(21), 7912. https://doi.org/10.3390/ijerph17217912

Russell, D. W. (1996). UCLA loneliness scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66(1), 20–40. https://doi.org/10.1207/s15327752jpa6601_2

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness.* Guilford Press.

Rylands, D., & Van Belle, J. P. (2017). The impact of facebook on the quality of life of senior citizens in Cape ToWn. In *IFIP advances in information and communication technology, AICT-504* (pp. 740–752). Springer International Publishing. https://doi.org/10.1007/978-3-319-59111-7_60

Sajithra, K., & Patil, R. (2013). Social media-history and components. *Journal of Business and Management*, 7, 69–74.

Sakurai, R., Nemoto, Y., Mastunaga, H., & Fujiwara, Y. (2021). Who is mentally healthy? Mental health profiles of Japanese social networking service users with a focus on LINE, facebook, twitter, and instagram. *PloS one*, 16(3), e0246090–e0246090. https://doi.org/10.1371/journal.pone.0246090

Sala, E., Cerati, G., & Gaia, A. (2021). Are social media users more satisfied with their life than non-users? A study on older Italians. *Ageing and Society*, 43(1), 1–13. https://doi.org/10.1017/S0144686X21000416

Schwaba, T., Bleidorn, W., Donnellan, B. (2021). Log on and prosper? little evidence for codevelopment between psychological adjustment and technology use in older adulthood. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 76(1), 67–77. https://doi.org/10.1093/geronb/gbaa073

Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, 36(4), 439–451. https://doi.org/10.1007/s11031-012-9279-4

Silver, L., C., Johnson, Jiang, J., Anderson, M., & Rainie, L. (2019). *Use of smartphones and social media is common across most emerging economies*. Pew Research Center. https://www.pewInternet.org/2019/03/07/use-of-smartphones-and-social-media-iscommon-across-most-emerging-economies/.

Simons, M., Reijnders, J., Janssens, M., Lataster, J., & Jacobs, N. (2023). Staying connected in old age: Associations between bonding social capital, loneliness and well-being and the value of digital media. *Aging & Mental Health*, 27(1), 147–155. https://doi.org/10.1080/13607863.2022.2036947

Sims, T., Reed, A. E., & Carr, D. C. (2017). Information and communication technology use is related to higher well-being among the oldest-old. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 72, 761–770. https://doi.org/10.1093/geronb/gbw130

Sims, T., Reed, A. E., & Carr, D. C. (2017). Information and communication technology use is related to higher well-being among the oldest-old. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 72, 761–770. https://doi.org/10.1093/geronb/gbw130

Siniscarco, M. T., Love-Williams, C., & Burnett-Wolle, S. (2017). Video conferencing: An intervention for emotional loneliness in long-term care. *Activities, Adaptation, & Aging*, 41(4), 316–329. https://doi.org/10.1080/01924788.2017.1326763

Smith, D., Leonis, T., & Anandavalli, S. (2021). Belonging and loneliness in cyberspace: Impacts of social media on adolescents' well-being. *Australian Journal of Psychology*, 73(1), 12–23. https://doi.org/10.1080/00049530.2021.1898914

Steptoe, A., Shankar, A., Demakakos, P., & Wardle, J. (2013). Social isolation, loneliness, and all-cause mortality in older men and women. *Proceedings of the National Academy of Sciences*, 110, 5797–5801 [online]. https://doi.org/10.1073/pnas.1219686110

Szabo, A., Allen, J., Stephens, C., & Alpass, F. (2019). Longitudinal analysis of the relationship between purposes of internet use and well-being among older adults. *The Gerontologist*, 59(1), 58–68. https://doi.org/10.1093/geront/gny036

Teo, A. R., Markwardt, S., & Hinton, L. (2019). Using skype to beat the blues: Longitudinal data from a national representative sample. *The American Journal of Geriatric Psychiatry*, 27(3), 254–262. https://doi.org/10.1016/j.jagp.2018.10.014

Torp, S., Hanson, E., Hauge, S., Ulstein, I., & Magnusson, L. (2008). A pilot study of how information and communication technology may contribute to health promotion among elderly spousal carers in Norway. *Health & Social Care in the Community*, 16(1), 75–85. https://doi.org/10.1111/j.1365-2524.2007.00725.x

Tsai, H. H., Cheng, C. Y., Shieh, W. Y., & Chang, Y. C. (2020). Effects of a smartphone-based videoconferencing program for older nursing home residents on depression, loneliness, and quality of life: A quasi-experimental study. *BMC geriatrics*, 20(1), 27–27. https://doi.org/10.1186/s12877-020-1426-2

Tsai, H. H., & Tsai, Y. F. (2011). Changes in depressive symptoms, social support, and loneliness over 1 year after a minimum 3-month videoconference program for older nursing home residents. *Journal of Medical Internet Research*, 13(4), e93–e93. https://doi.org/10.2196/jmir.1678

Tsai, H. H., Tsai, Y. F., Wang, H. H., Chang, Y. C., & Chu, H. H. (2010). Videoconference program enhances social support, loneliness, and depressive status of elderly nursing home residents. *Aging & Mental Health*, 14(8), 947–954. https://doi.org/10.1080/13607863.2010.501057

United-Nations-Department-of-Economic-and-Social-Affairs, Population-Division (2020). *World Population Ageing 2020 Highlights: Living arrangements of older persons (ST/ESA/SER.A/451)*. United Nations.

Van Boekel, L. C., Peek, S. T. M., & Luijkx, K. G. (2017). Diversity in older adults' use of the internet: Identifying subgroups through latent class analysis. *Journal of Medical Internet Research*, 19(5), e180–e180. https://doi.org/10.2196/jmir.6853

van Ingen, E., Rains, S. A., & Wright, K. B. (2017). Does social network site use buffer against well-being loss when older adults face reduced functional ability? *Computers in Human Behavior*, 70, 168–177. https://doi.org/10.1016/j.chb.2016.12.058

Wallinheimo, A. S., & Evans, S. L. (2021). More frequent internet use during the COVID-19 pandemic associates with enhanced quality of life and lower depression scores in middle-aged and older adults. *Healthcare (Basel)*, 9(4), 393–. https://doi.org/10.3390/healthcare9040393

Wan Mohd Azam, W. M. Y., Din, N. C., Ahmad, M., Ghazali, S. E., Ibrahim, N., Said, Z., Ghazali, A. R., Shahar, S., Razali, R., & Maniam, T. (2013). Loneliness and depression among the elderly in an agricultural settlement: Mediating effects of social support. *Asia-Pacific Psychiatry*, 5(S1), 134–139.

Webster, D., Dunne, L., & Hunter, R. (2021). Association between social networks and subjective well-being in adolescents: A systematic review. *Youth & Society*, 53(2), 175–210. https://doi.org/10.1177/0044118X20919589

Werner-Seidler, A., Afzali, M. H., Chapman, C., Sunderland, M., & Slade, T. (2017). The relationship between social support networks and depression in the 2007 National survey of mental health and well-being. *Social Psychiatry and Psychiatric Epidemiology*, 52(12), 1463–1473. https://doi.org/10.1007/s00127-017-1440-7

Wigfield, A., Turner, R., Alden, S., Green, M., & Karania, V. K. (2022). Developing a new conceptual framework of meaningful interaction for understanding social isolation and loneliness. *Social Policy and Society: a Journal of the Social Policy Association*, 21(2), 172–193. https://doi.org/10.1017/S147474642000055X

Wiggins, R. D., Netuveli, G., Hyde, M., Higgs, P., & Blane, D. (2008). The evaluation of a self-enumerated scale of quality of life (CASP-19) in the context of research on

ageing: a combination of exploratory and confirmatory approaches. *Social Indicators Research*, 89(1), 61–77. https://doi.org/10.1007/s11205-007-9220-5

Wiwatkunupakarn, N., Pateekhum, C., Aramrat, C., Jirapornchaoren, W., Pinyopornpanish, K., & Angkurawaranon, C. (2022). Social networking site usage: A systematic review of its relationship with social isolation, loneliness, and depression among older adults. *Aging & Mental Health*, 26(7), 1318–1326. https://doi.org/10.1080/13607863.2021.1966745

Woodward, A. T., Freddolino, P. P., Blaschke-Thompson, C. M., Wishart, D. J., Bakk, L., Kobayashi, R., & Tupper, C. (2010). Technology and aging project: training outcomes and efficacy from a randomized field trial. *Ageing International*, 36(1), 46–65. https://doi.org/10.1007/s12126-010-9074-z

Wu, H.-Y., & Chiou, A.-F. (2020). Social media usage, social support, intergenerational relationships, and depressive symptoms among older adults. *Geriatric Nursing*, 41. https://doi.org/10.1016/j.gerinurse.2020.03.016

Yachin, M., & Nimrod, G. (2021). Innovation in later life: A study of grandmothers and facebook. *International Journal of Aging & Human Development*, 92(4), 521–540. https://doi.org/10.1177/0091415020940200

Yang, C., Lai, D. W. L., Sun, Y., Ma, C. Y., & Chau, A. K. C. (2022). Mobile application use and loneliness among older adults in the digital age: Insights from a survey in Hong Kong during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19(13), 7656–. https://doi.org/10.3390/ijerph19137656

Yang, S., Huang, L., Zhang, Y., Zhang, P., & Zhao, Y. C. (2021). Unraveling the links between active and passive social media usage and seniors' loneliness: A field study in aging care communities. *Internet Research*, 31(6), 2167–2189. https://doi.org/10.1108/INTR-08-2020-0435

Yang, X., Yip, B. H. K., Mak, A. D. P., Zhang, D., Lee, E. K. P., & Wong, S. Y. S. (2021). The differential effects of social media on depressive symptoms and suicidal ideation among the younger and older adult population in

Hong Kong during the covid-19 pandemic: Population-based cross-sectional survey study. *JMIR Public Health and Surveillance*, 7(5), e24623–e24623. https://doi.org/10.2196/24623

Yang, Y., Grol-Prokopczyk, H., Reid, M. C., & Pillemer, K. (2022). The relationship between pain and psychological distress during the COVID-19 pandemic: Is social technology use protective? *Pain Medicine (Malden, Mass.)*, 23(2), 280–287. https://doi.org/10.1093/pm/pnab262

Yesavage, J. A., & Sheikh, J. I. (1986). 9/Geriatric depression scale (GDS): Recent evidence and development of a shorter version. *Clinical Gerontologist*, 5(1-2), 165–173. https://doi.org/10.1300/J018v05n01_09

Yeung, A., Fung, F., Yu, S.-C., Vorono, S., Ly, M., Wu, S., & Fava, M. (2008). Validation of the Patient Health Questionnaire-9 for depression screening among Chinese Americans. *Comprehensive Psychiatry*, 49, 211–217. https://doi.org/10.1016/j.comppsych.2006.06.002

Yu, R. P., McCammon, R. J., Ellison, N. B., & Langa, K. M. (2016). The relationships that matter: social network site use and social wellbeing among older adults in the United States of America. *Ageing and Society*, 36(9), 1826–1852. https://doi.org/10.1017/S0144686X15000677

Zhang, A., Wroblewski, K. E., Imbery, T. E., McClintock, M. K., Hawkley, L. C., & Pinto, J. M. (2023). Can digital communication protect against depression for older adults with hearing and vision impairment during COVID-19? *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*, 78(4), 629–638. https://doi.org/10.1093/geronb/gbac193

Zhang, K., Kim, K., Silverstein, N. M., Song, Q., & Burr, J. A. (2021). Social media communication and loneliness among older adults: The mediating roles of social support and social contact. *The Gerontologist*, 61(6), 888–896. https://doi.org/10.1093/geront/gnaa197

Zhou, J. (2018). Improving older people's life satisfaction via social networking site use: Evidence from China. *Australasian Journal on Ageing*, 37(1), E23–E28. https://doi.org/10.1111/ajag.12499