Gurses et al, Gerontechnology (2026) 25:3
https://doi.org/10.30289/gt.202604_25(3).1333

Technology-based interventions to minimize the impact of social isolation among older adults: A narrative review

Ece Gurses[a], *Cynthia van Golen PhD*[b,*]
[a]*Department of Psychology and Neuroscience, Baylor University, Waco, TX, United States;*
[b]*Department of Biological Sciences, Delaware State University, Dover, DE, United States*

**Corresponding author: cvangolen@desu.edu*

Abstract
Background: The percentage of older adults in the population is increasing worldwide. Social isolation and loneliness are related but distinct problems that are associated with adverse health outcomes in later life.
Research aim: Evidence on technology-based interventions is scattered across public health, psychology, and gerontechnology, and previous reviews often focus on single intervention types or do not clearly distinguish between outcomes related to social isolation and loneliness. This review aims to synthesize current research on the causes and effects of social isolation in older adults and to explore the potential of technologies to reduce these negative impacts.
Methods: We conducted a narrative review using keyword searches in PubMed and Google Scholar for publications from 2000 to 2025, including peer-reviewed studies and major organizational reports that examined social isolation and/or loneliness in adults aged 60 and older. We focused on technology-based approaches aimed at reducing social isolation or enhancing related psychosocial outcomes. Findings were synthesized qualitatively across different intervention categories.
Results: The reviewed literature indicates that technology-based interventions, including video communication, virtual reality, AI-enabled companionship, and socially assistive technologies, more consistently improve measures of social connectedness than loneliness outcomes, which appear more variable across studies and may depend on intervention design, access, and user support.
Conclusions: Technology-based approaches show promise for reducing social isolation, but benefits are uneven across populations. Future work should use standardized isolation and loneliness measures and evaluate longer-term, real-world effectiveness in diverse settings.

Keywords: social isolation, older adults, technology, loneliness, social connectedness

Introduction

Social isolation among older adults is a major concern in modern societies as population aging and evolving social structures can decrease opportunities for ongoing social contact. There are various definitions of social isolation, but they generally describe the reduction of social participation and interactions, leading to lower feelings of social belonging (Ran et al., 2024). In this review, we differentiate social isolation from loneliness because they are distinct concepts and are measured differently. Social isolation refers to objectively measurable social disconnectedness (e.g., the amount or frequency of social contact and participation), while loneliness pertains to the subjective distress caused by perceived inadequacy of social relationships (de Jong Gierveld et al., 2006; Newall & Menec, 2019). Although related, social isolation and loneliness do not always occur together; an individual may have limited contact without feeling lonely or feel lonely despite frequent contact (Newall & Menec, 2019).

In older adults, this is mostly caused by lifestyle changes after retirement, loss of loved ones, physical impairments such as reduced mobility or vision, stopping participation in favorite activities, and living alone (Gerlach et al., 2024). National data show that social isolation is common in later life and has become a priority for healthcare systems. A scientific consensus report estimated that nearly 24% of Americans aged 65 and older were socially isolated in 2020 (National Academies of Sciences, Engineering, and Medicine, 2020). The World Health Organization notes that social isolation and loneliness are widespread among older adults, but there are currently no global estimates of how many older people experience these conditions; avail-

able estimates differ by region and measurement method (World Health Organization, 2021). Reported rates vary across studies because measurement approaches differ, but systematic reviews and meta-analyses consistently identify social isolation and loneliness as significant concerns in aging populations (Ran et al., 2024; Salari et al., 2025).

Various social and demographic factors can decrease opportunities for ongoing contact later in life, including bereavement, retirement, health-related mobility limits, and evolving family or community structures (Gerlach et al., 2024; National Academies of Sciences, Engineering, and Medicine, 2020). Simultaneously, digital technologies are increasingly utilized for communication, services, and social engagement; however, barriers to adoption among older adults remain significant. Older adults' willingness to adopt new digital technologies depends on usability, perceived usefulness, access, confidence, and support—factors that can hinder real-world adoption even when tools are available (Schroeder et al., 2023). These barriers to adoption matter because interventions that depend on digital platforms may mostly benefit older adults who already have access and familiarity with technology, potentially increasing disparities if training and support are not provided (Schroeder et al., 2023).

Understanding and addressing the health impacts of social isolation in older adults is crucial, as it significantly affects their well-being. Social isolation not only contributes to emotional issues like depression and anxiety but also impacts physical health. A substantial body of evidence links social isolation and loneliness to negative health outcomes, including increased risk of death and poorer physical and mental health indicators (Holt-Lunstad et al., 2015; Shankar et al., 2011; Tomaka et al., 2006). There are also concerning cognitive effects; social isolation has been connected to memory decline in older age (Read et al., 2020). Neuroimaging studies further suggest biological connections: Spreng et al. (2020) found that perceived social isolation correlates with differences in the brain's default network, which may influence cognition and socioemotional processing.

Researchers and healthcare providers have responded to these health effects by exploring technologies aimed at reducing social isolation and enhancing related psychosocial outcomes. Technology-based interventions studied in older adults include communication platforms (e.g., videoconferencing), immersive virtual reality experiences, and AI-enabled or socially assistive technologies (Abdi et al., 2018; Balki et al., 2022; Dermody et al., 2020; Tsai et al., 2010). Evidence syntheses indicate that technology interventions more reliably improve measures of social connectedness than loneliness outcomes, which tend to be more variable across studies and settings (Balki et al., 2022; Welch et al., 2023). Although digital literacy among older adults can be lower, thoughtful design and implementation strategies (e.g., simple interfaces, accessibility features, onboarding, and ongoing support) can enhance feasibility and benefits (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023). Early work in gerontechnology also shows that socially assistive technologies can affect engagement and interaction in care environments, although effects differ depending on context and implementation (Wada et al., 2004; Abdi et al., 2018).

In this review, we explore the health effects linked to social isolation and assess technology-based interventions aimed at reducing social isolation or enhancing related psychosocial outcomes in older adults. Existing evidence on these interventions is scattered across disciplines like public health, psychology, and gerontechnology, with many reviews focusing on a single intervention category without integrating findings across different technology types or clearly differentiating outcomes related to social isolation versus loneliness (Balki et al., 2022; Welch et al., 2023). This narrative review combines evidence from various technology categories, explains how outcomes are measured and reported (social isolation versus loneliness), and highlights design and implementation factors important for promoting equitable adoption among older adult populations.

Methods

Review design

This study was conducted as a narrative review using a structured search, screening, and qualitative synthesis approach. The review aimed to synthesize evidence across disciplines (public health, psychology, and gerontechnology) and multiple technology categories, rather than focusing on a single intervention type or study design.

Search strategy and information sources

We searched PubMed and Google Scholar using combinations of keywords related to (i) population ("older adults," "elderly," "aging"), (ii) constructs ("social isolation," "loneliness," "social connectedness"), and (iii) intervention types ("technology," "digital intervention," "videoconferencing," "virtual reality," "socially assistive robot," "AI companion"). Google Scholar was included to capture interdisciplinary gerontechnology literature and conference proceedings

not consistently indexed in PubMed. Additionally, we included major organizational reports and evidence summaries relevant to social isolation and loneliness in older adults, including publications from the National Academies of Sciences, Engineering, and Medicine, and the World Health Organization.

Timeframe
The search included publications from 2000 to 2025. Older sources within this range were kept when needed for standard definitions or background information, while recent evidence syntheses were prioritized for technology-based interventions.

Study selection and eligibility criteria
Titles and abstracts were screened for relevance, followed by full-text review of eligible sources.

Sources were included if they: (1) focused on adults aged ≥60 (or reported results for an older-adult subgroup), including community-dwelling and long-term care populations; (2) addressed social isolation and/or loneliness as a primary construct, outcome, or relevant mechanism for older adults; and (3) described or evaluated a technology-based approach aimed at reducing social isolation, increasing social connectedness, or improving related psychosocial outcomes (e.g., videoconferencing, virtual reality-based interventions, AI-enabled companionship, and socially assistive technologies/robots). Peer-reviewed empirical studies, systematic reviews, umbrella reviews/meta-analyses, and major organizational reports were eligible.

Sources were excluded if they focused only on children or younger adults without older-adult subgroup findings, did not include a technology component, did not address social isolation/loneliness outcomes or mechanisms, or were opinion-only pieces without empirical evidence or synthesis.

After title and abstract screening and subsequent full-text assessment according to the eligibility criteria described above, we included 24 publications and major organizational reports in the final narrative synthesis. Because this was a narrative review and we did not retain numerical records of the initial search yield and intermediate screening stages, we do not report a PRISMA-style accounting of records identified and excluded.

Data extraction and synthesis
We reviewed the full texts of eligible sources. For each included source, we extracted information relevant to its role in the review, including study design, population and setting, social isolation and/or loneliness constructs examined, technology intervention characteristics when applicable, outcomes measured (e.g., social isolation, loneliness, social connectedness, mental health, or cognition), and key findings and limitations. Findings were summarized narratively and organized into three main themes: (1) social isolation and loneliness as concerns among older adults, including prevalence trends and definitional differences; (2) physical, emotional, cognitive, and behavioral effects related to social isolation and/or loneliness; and (3) technology-based interventions aimed at reducing these effects, divided into communication tools (like videoconferencing), virtual reality programs, and AI-enabled companionship and socially assistive robots. Since this was a narrative review, no meta-analysis was conducted; instead, we highlighted patterns, limitations, and implications for gerontechnology design and research across the studies.

Language and source types
We included English-language publications. In addition to peer-reviewed studies and reviews, we included major organizational reports relevant to older adults and social isolation/loneliness.

Results

The findings from the articles and reports reviewed are organized into three main areas. First, social isolation and loneliness among older adults are discussed, including prevalence trends. Second, the physical, emotional, cognitive, and behavioral effects linked to social isolation and loneliness are summarized. Third, technology-based interventions currently used or tested to reduce social isolation and support older adults are reviewed.

Social isolation as a growing concern among older adults

Social isolation is a major concern for older adults and has been identified as a priority for aging societies and healthcare systems (National Academies of Sciences, Engineering, and Medicine, 2020; World Health Organization, 2021). The number and proportion of the older adult population have grown in recent years (U.S. Census Bureau, 2026). Both national and international reports estimate that about one-quarter of older adults face social isolation, including nearly 24% of Americans aged 65 and older in 2020 (National Academies of Sciences, Engineering, and Medicine, 2020).

Meta-analytic evidence shows that loneliness remains common among older adults worldwide (27.6%), with higher rates reported in North

America (30.5%) and among institutionalized elders (50.7%) (Salari et al., 2025). Systematic reviews and meta-analyses also continue to highlight social isolation and loneliness as major concerns in aging populations (Ran et al., 2024; Gerlach et al., 2024).

Because social isolation and loneliness are distinct constructs (defined in the Introduction), trends and intervention outcomes should be interpreted accordingly: technologies that increase contact opportunities may improve measurable connectedness, while loneliness outcomes may depend more strongly on perceived relationship quality and emotional support (Newall & Menec, 2019; Balki et al., 2022). *Table 1* summarizes key conceptual differences between social isolation and loneliness, including definitions, measurement, and implications for intervention design.

The COVID-19 period heightened concerns about reduced in-person contact and limited social participation among older adults, and longitudinal evidence shows changes in loneliness over time during the pandemic (Luchetti et al., 2020). Simultaneously, barriers to adoption can restrict the feasibility of technology-based solutions for older populations, as the intention to adopt digital technologies is affected by usability, perceived usefulness, access, confidence, and support (Schroeder et al., 2023). These factors are crucial for understanding intervention outcomes because access and ongoing support can influence whether digital tools lead to better connectedness or less loneliness in real-world settings (Balki et al., 2022; Welch et al., 2023).

The impact of social isolation on older adults

The literature describes links between social isolation and/or loneliness and a variety of negative outcomes in older adults, including physical health, mental health, cognitive function, and overall well-being (Shankar et al., 2011; Tomaka et al., 2006). Meta-analytic evidence shows a connection between social isolation and higher mortality risk (Holt-Lunstad et al., 2015). Additionally, observational studies associate loneliness and social isolation with negative behavioral and biological health markers and poorer disease-related outcomes (Shankar et al., 2011; Tomaka et al., 2006).

Cognitive outcomes are also emphasized. Cohort evidence indicates links between social isolation/loneliness and memory decline over time (Read et al., 2020), and neuroimaging research shows connections between perceived social isolation and brain network organization (Spreng et al., 2020). Together, these findings highlight that social isolation and loneliness are clinically significant factors associated with health and cognitive outcomes in older adults. *Table 2* outlines the reported types of impacts related to social isolation and/or loneliness in older adults across physical, mental, cognitive, and behavioral/social functioning categories.

The following section summarizes technology-based approaches studied to mitigate social isolation and related outcomes in older adults.

Technology interventions to combat social isolation

During the COVID-19 pandemic, the widespread lockdown emphasized both the impacts of social isolation and the potential for technology to lessen some effects of reduced social contact (Kim et al., 2020). Evidence syntheses show that technology-based interventions can help older adults stay socially connected, although results vary by intervention type, study setting, and participant factors (Balki et al., 2022; Welch et al., 2023). Additional systematic reviews also suggest that digital technologies can decrease social isolation and enhance social well-being in older adults (Sen et al., 2022). AI-enabled conversational companions have also been proposed as a form of digital companionship for older adults (Alessa & Al-Khalifa, 2023). A common theme across studies is that access, usability, and ongoing support determine whether digital tools provide meaningful benefits for older adults (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023).

Communication and videoconferencing interventions can promote regular contact with family, friends, and care providers and are among the most studied approaches. In nursing home settings, a videoconferencing program has been linked to increased social support and decreased loneliness and depression (Tsai et al., 2010). Broader evidence syntheses show that interventions that strengthen existing relationships and enable frequent contact are often associated with better social connectedness (Balki et al., 2022). An umbrella review concluded that technology interventions can reduce social isolation and loneliness and improve connectedness, although results vary depending on study design and setting (Balki et al., 2022). An evidence and gap map highlights the wide range of research on digital interventions for social isolation and loneliness in older adults, while also noting limitations in representation and study environments (e.g., focus on high-income countries and underrepresentation of the "older-old") (Welch et al., 2023). These gaps are significant because the feasibility and effectiveness of interventions may vary greatly based on access and care contexts

Table 1. Conceptual comparison of social isolation and loneliness in older adults (definitions, measurement, and implications for interventions). Adapted from Newall and Menec (2019), Courtin and Knapp (2017), Shankar et al. (2011), Coyle and Dugan (2012), Tomaka et al. (2006), and Holt-Lunstad et al. (2015).

Factor	Social isolation	Loneliness
Definition	Objective lack of social contact, participation, or social network ties (measurable social disconnectedness)	Subjective distress due to a perceived gap between desired and actual social relationships
Examples of correlates (not exhaustive)	Living alone, reduced mobility, reduced participation, smaller social networks, and fewer contact opportunities	Perceived lack of meaningful connection or emotional support may occur even with frequent contact
Measurement (examples)	Network size, frequency of contact, participation in activities, living arrangements, social support indicators	Self-reported loneliness scales or survey items assessing perceived loneliness/distress
Relationship between constructs	May be associated with loneliness, but the two do not always co-occur	May occur with or without objective isolation
Health associations (examples)	Associated with adverse health outcomes in older adults, including increased mortality risk reported in meta-analytic evidence	Associated with adverse mental health outcomes and poorer health-related indicators in older adults
Implications for interventions	Often targeted by increasing opportunities for contact and participation (objective connectedness)	Often requires addressing perceived relationship quality and emotional support in addition to contact frequency

(National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023).

Digital mental health tools have also been examined for depression and anxiety, including internet-based cognitive behavioral therapy. A meta-analysis of routine-care studies showed benefits for adults receiving internet-based CBT for depression and anxiety (Etzelmueller et al., 2020). However, evidence specific to older adults and to outcomes directly related to social isolation versus loneliness remains less consistent, highlighting the importance of aligning intervention goals with outcome measures (Balki et al., 2022; Welch et al., 2023).

Virtual reality (VR) interventions offer immersive virtual environments that may boost engagement and well-being in some older adults. A systematic review highlighted potential benefits of VR-based interventions for community-dwelling older adults, although study designs and outcome measures differ (Dermody et al., 2020). Feasibility evidence also indicates that immersive VR experiences can be acceptable and helpful for some older adults with cognitive and/or physical impairments (Appel et al., 2020). Implementation may be limited by device complexity, supervision needs, and accessibility issues (Dermody et al., 2020; Schroeder et al., 2023).

Socially assistive technologies, including robotic companions, have been reviewed as potential ways to support engagement and lessen psychosocial burden in older adult care settings (Abdi et al., 2018). Early work in gerontechnology also shows that robot-assisted activities can affect engagement and interaction in day service environments (Wada et al., 2004). Overall, evidence indicates potential benefits, but outcomes vary, and long-term impact likely depends on personalization, setting, and ongoing support (Abdi et al., 2018; Welch et al., 2023). Studies on socially assistive robots for older adults also recommend increasing interactivity and personalization to enhance user experience and engagement in real-world environments (Hofstede et al., 2025a).

Across intervention types, the literature suggests that improvements in measurable social connectedness are often more consistent than reductions in loneliness, and that benefits depend on access, usability, and sustained support (Balki et al., 2022; Schroeder et al., 2023; Welch et al., 2023). These findings emphasize that "technology plus support" is often the practical unit of intervention in older populations (National Academies of Sciences, Engineering, and Medicine, 2020). Therefore, implementation context is critical. Stable connectivity, caregiver or community support, and accessible design can influence both the adoption and continued use of technology-based interventions among older adults (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023). Older adults with limited access, digital confidence, sensory impairments, or financial constraints may need additional support to benefit from these tools (Schroeder et al., 2023).

Table 2. Reported types of impacts associated with social isolation and/or loneliness in older adults. Adapted from Holt-Lunstad et al. (2015), Shankar et al. (2011), Tomaka et al. (2006), Read et al. (2020), and Spreng et al. (2020).

Type of impact	Examples of reported associations (illustrative, not exhaustive)
Physical health	Increased mortality risk, adverse health indicators, and disease-related outcomes
Mental health	Higher depression and anxiety symptoms; poorer emotional well-being
Cognitive health	Associations with memory decline and cognitive outcomes over time; neurobiological correlates reported in neuroimaging work
Behavioral/social functioning	Reduced social participation and engagement; changes in health-related behaviors reported in observational evidence

Discussion

Implications for practice and design

The articles and reports reviewed in this paper show that social isolation among older adults is a significant concern in aging populations and has serious effects on health and well-being. As summarized in evidence syntheses and large

reports, social isolation and loneliness are linked to negative outcomes across physical and mental health, including increased risk of mortality and poorer health indicators (Holt-Lunstad et al., 2015; Shankar et al., 2011; Tomaka et al., 2006). Cohort studies also connect social isolation and loneliness to memory decline over time (Read et al., 2020), and neuroimaging research reports links between perceived social isolation and brain network organization (Spreng et al., 2020). These findings highlight that social isolation should be regarded as a critical public health issue in aging societies, not merely an individual or temporary problem (National Academies of Sciences, Engineering, and Medicine, 2020; World Health Organization, 2021).

Overall, the reviewed evidence suggests that technology can help reduce some effects of isolation when implemented with proper access, usability, and support. Video communication platforms, online social networks, and telehealth visits can assist older adults in staying connected with family, friends, and healthcare providers. Several studies report lower loneliness and improved emotional support when older adults use these tools regularly. Evidence syntheses indicate that technology-based interventions can support social connectedness, but effects vary depending on the intervention type and context; notably, measurable connectedness outcomes appear more consistent than loneliness outcomes across studies (Balki et al., 2022; Welch et al., 2023). This distinction matters because interventions that increase contact opportunities may reduce objective isolation, while reducing loneliness may require enhancements in perceived relationship quality and emotional support (Newall & Menec, 2019).

Virtual reality programs can offer people in long-term care or at home the opportunity to visit new places and share experiences. Systematic review evidence indicates potential benefits of VR interventions for community-dwelling older adults, although designs and outcome measures vary (Dermody et al., 2020), and feasibility evidence shows that immersive VR experiences can be acceptable and beneficial for some older adults with cognitive and/or physical impairments (Appel et al., 2020). However, implementation may be limited by device complexity and accessibility needs (Dermody et al., 2020; Schroeder et al., 2023). Mental health applications and online therapy platforms may provide more accessible support for mood and anxiety symptoms. A meta-analysis of routine-care studies reported positive effects of internet-based cognitive behavioral therapy for depression and anxiety in adults (Etzelmueller et al., 2020), although evidence specific to older adults and outcomes directly related to social isolation versus loneliness remains less consistent across the reviewed literature (Balki et al., 2022; Welch et al., 2023). Socially assistive robots, such as robotic pets, appear to improve mood, social interaction, and engagement, especially for people with dementia. Scoping review evidence suggests socially assistive technologies can support engagement and interaction in older adult care settings (Abdi et al., 2018), and early gerontechnology research shows that robot-assisted activities can influence engagement in day service environments (Wada et al., 2004). Across these intervention types, outcomes vary, and sustained impact likely depends on setting, personalization, and ongoing support (Abdi et al., 2018; Welch et al., 2023).

At the same time, evidence also shows that not all older adults benefit equally from these tools. Many studies were conducted in high-income countries and included people who already had internet access, devices, and at least some familiarity with technology. Very old adults, those living in care homes with limited resources, people with lower incomes, and individuals from minority or marginalized groups are often missing from the samples. An evidence and gap map highlights limitations in representativeness and study settings, including a focus on high-income countries and underrepresentation of the "older-old" (Welch et al., 2023). If new tools are only designed and tested in well-resourced environments, there is a risk that technology will help those who are already connected while leaving others further behind. These concerns align with research showing that usability, perceived usefulness, access, confidence, and available support greatly influence older adults' willingness to adopt digital technologies (Schroeder et al., 2023). This also resonates with broader worries that digital health technologies may widen health disparities when access and support vary across populations (Goto et al., 2021). Recent studies on socially assistive robotics further emphasize that personalization and interactivity are essential design features for acceptance and ongoing use, and that implementation must consider diverse user needs and contexts (Hofstede et al., 2025a; Gasteiger et al., 2023).

The findings indicate that support around technology is just as crucial as the technology itself. Older adults with reliable internet, family members or caregivers willing to assist, and opportunities to practice using new tools at their own pace are more likely to benefit. This suggests that future programs should prioritize simple

designs, clear instructions, and ongoing support, rather than just providing devices. Tools designed with older adults in mind—considering sensory changes, mobility limitations, and personal preferences—are more likely to be used frequently and to make a meaningful difference in daily life. Practically, the evidence reviewed indicates that "technology plus support" often forms the most effective intervention, and that the success of implementation—such as connectivity, onboarding/training, and continuous assistance—directly influences real-world benefits (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023). Consistent with this, research on socially assistive robots shows that customizing communication and interaction styles can enhance acceptance and perceived persuasiveness (Hofstede et al., 2025b).

Limitations and future research

There are limitations to the current research and this review. Many studies had small sample sizes or short follow-up periods, making it difficult to determine how long the benefits last. Different authors used various methods to define and measure social isolation and loneliness, which complicates cross-study comparisons. This review relies on published studies and major organizational reports and does not include a formal meta-analysis or all available articles on the topic. As a result, some work may have been overlooked, and exact effect sizes cannot be calculated. These limitations align with evidence syntheses that note heterogeneity in definitions, outcome measures, and study settings across the technology intervention literature (Balki et al., 2022; Welch et al., 2023). Future research should involve more diverse groups of older adults, especially those over 80 years old and underrepresented populations, and should follow participants over longer periods. Studies that combine technology with in-person support and community programs may be particularly effective for developing solutions that are both impactful and equitable, a point emphasized further in this review's conclusions. Future work should also adopt standardized measures that differentiate social isolation from loneliness, report implementation factors (such as connectivity, training, and support levels), and compare approaches of "technology alone" versus "technology plus structured human support" to identify scalable and fair solutions (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023; Welch et al., 2023).

Conclusion

This narrative review shows that social isolation and loneliness in older adults are linked to negative health outcomes across physical, mental, and cognitive areas (Holt-Lunstad et al., 2015; Shankar et al., 2011; Tomaka et al., 2006; Read et al., 2020). Evidence from reviews and observational studies connects social isolation and loneliness to higher risk of death and worse health indicators (Holt-Lunstad et al., 2015; Shankar et al., 2011; Tomaka et al., 2006). Cognitive effects are also emphasized, with research showing that social isolation and loneliness can lead to memory decline over time (Read et al., 2020), and neuroimaging studies showing links between perceived social isolation and brain network structure (Spreng et al., 2020). Major organizations also recognize social isolation and loneliness as public health issues in aging populations (National Academies of Sciences, Engineering, and Medicine, 2020; World Health Organization, 2021). In the U.S., about 24% of adults aged 65 and older living in the community are estimated to be socially isolated (National Academies of Sciences, Engineering, and Medicine, 2020).

Across the evidence reviewed, technology-based interventions show promise for improving measurable social connectedness, while loneliness outcomes vary more and may depend on intervention design, context, and user support (Balki et al., 2022; Welch et al., 2023). These findings indicate that effective gerontechnology solutions often need "technology plus support," including accessible design, onboarding/training, and ongoing assistance—especially for older adults with limited access or lower digital confidence (National Academies of Sciences, Engineering, and Medicine, 2020; Schroeder et al., 2023).

Future research should use standardized measures that differentiate social isolation from loneliness, include more representative populations (such as adults aged ≥80 and under-resourced communities), and assess long-term effectiveness in real-world settings (Welch et al., 2023). Comparing "technology alone" with "technology plus structured human support" would be especially useful for finding scalable and fair solutions. Overall, carefully designed and well-supported technology can play a key role in broader efforts to reduce social isolation and enhance quality of life for older adults.

References

Abdi, J., Al-Hindawi, A., Ng, T., & Vizcaychipi, M. P. (2018). Scoping review on the use of socially assistive robot technology in elderly care. BMJ Open, 8(2), Article e018815. https://doi.org/10.1136/bmjopen-2017-018815

Alessa, A., & Al-Khalifa, H. S. (2023). Towards designing a ChatGPT conversational companion for elderly people. In Proceedings of the 16th International Conference on PErvasive Technologies Related to Assistive Environments (PETRA '23) (pp. 667–674). Association for Computing Machinery. https://doi.org/10.1145/3594806.3596572

Appel, L., Appel, E., Bogler, O., Wiseman, M., Cohen, L., Ein, N., Abrams, H. B., & Campos, J. L. (2020). Older adults with cognitive and/or physical impairments can benefit from immersive virtual reality experiences: A feasibility study. Frontiers in Medicine, 6, Article 329. https://doi.org/10.3389/fmed.2019.00329

Balki, E., Hayes, N., & Holland, C. (2022). Effectiveness of technology interventions in addressing social isolation, connectedness, and loneliness in older adults: Systematic umbrella review. JMIR Aging, 5(4), Article e40125. https://doi.org/10.2196/40125

Courtin, E., & Knapp, M. (2017). Social isolation, loneliness and health in old age: A scoping review. Health & Social Care in the Community, 25(3), 799–812. https://doi.org/10.1111/hsc.12311

Coyle, C. E., & 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., & Dykstra, P. A. (2006). Loneliness and social isolation. In A. L. Vangelisti & D. Perlman (Eds.), The Cambridge handbook of personal relationships (pp. 485–500). Cambridge University Press.

Dermody, G., Whitehead, L., Wilson, G., & Glass, C. (2020). The role of virtual reality in improving health outcomes for community-dwelling older adults: Systematic review. Journal of Medical Internet Research, 22(6), Article e17331. https://doi.org/10.2196/17331

Etzelmueller, A., Vis, C., Karyotaki, E., Baumeister, H., Titov, N., Berking, M., Cuijpers, P., Riper, H., & Ebert, D. D. (2020). Effects of internet-based cognitive behavioral therapy in routine care for adults in treatment for depression and anxiety: Systematic review and meta-analysis. Journal of Medical Internet Research, 22(8), Article e18100. https://doi.org/10.2196/18100

Gasteiger, N., Hellou, M., & Ahn, H. S. (2023). Factors for personalization and localization to optimize human–robot interaction: A literature review. International Journal of Social Robotics, 15(4), 689–701. https://doi.org/10.1007/s12369-021-00811-8

Gerlach, L. B., Solway, E. S., & Malani, P. N. (2024). Social isolation and loneliness in older adults. JAMA, 331(23), 2058. https://doi.org/10.1001/jama.2024.3456

Goto, R., Watanabe, Y., Yamazaki, A., Sugita, M., Takeda, S., Nakabayashi, M., & Nakamura, Y. (2021). Can digital health technologies exacerbate the health gap? A clustering analysis of mothers' opinions toward digitizing the maternal and child health handbook. SSM – Population Health, 16, Article 100935. https://doi.org/10.1016/j.ssmph.2021.100935

Hofstede, B. M., Askari, S. I., Lukkien, D., Gosetto, L., Alberts, J. W., Tesfay, E., Stal, M. T., van Hoesel, T. R. C., Cuijpers, R. H., Vastenburg, M. H., Bevilacqua, R., Amabili, G., Margaritini, A., Benadduci, M., Guebey, J., Trabelsi, M. A., Ciuffreda, I., Casaccia, S., IJsselsteijn, W., . . . Nap, H. H. (2025a). A field study to explore user experiences with socially assistive robots for older adults: Emphasizing the need for more interactivity and personalisation. Frontiers in Robotics and AI, 12, Article 1537272. https://doi.org/10.3389/frobt.2025.1537272

Hofstede, B. M., Askari, S. I., van Hoesel, T. R. C., Cuijpers, R. H., de Witte, L. P., IJsselsteijn, W. A., & Nap, H. H. (2025b). Huggable integrated socially assistive robots: Exploring the potential and challenges for sustainable use in long-term care contexts. Frontiers in Robotics and AI, 12, Article 1646353. https://doi.org/10.3389/frobt.2025.1646353

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. Perspectives on Psychological Science, 10(2), 227–237. https://doi.org/10.1177/1745691614568352

Kim, Y. C., Kohn, G., Davis, C., & Saunders, P. (2020). The effect of technology use in reducing social isolation or loneliness in older adults: A systematic review. Innovation in Aging, 4(Suppl. 1), 927. https://doi.org/10.1093/geroni/igaa057.3400

Luchetti, M., Lee, J. H., Aschwanden, D., Sesker, A., Strickhouser, J. E., Terracciano, A., & Sutin, A. R. (2020). The trajectory of loneliness in response to COVID-19. American Psychologist, 75(7), 897–908. https://doi.org/10.1037/amp0000690

National Academies of Sciences, Engineering, and Medicine. (2020). Social isolation and loneliness in older adults: Opportunities for the health care system. National Academies Press. https://doi.org/10.17226/25663

Newall, N. E. G., & Menec, V. H. (2019). Loneliness and social isolation of older adults: Why it is important to examine these social aspects together. Journal of Social and Personal Relationships, 36(3), 925–939. https://doi.org/10.1177/0265407517749045

Ran, Z., Wei, J., Yang, G., & Yang, C. (2024). Prevalence of social isolation in the elderly: A systematic review and meta-analysis. Geriatric Nursing, 58, 87–97. https://doi.org/10.1016/j.gerinurse.2024.05.008

Read, S., Comas-Herrera, A., & Grundy, E. (2020). Social isolation and memory decline in later life. The Journals of Gerontology: Series B, 75(2), 367–376.

https://doi.org/10.1093/geronb/gbz152

Salari, N., Najafi, H., Rasoulpoor, S., Canbary, Z., Heidarian, P., & Mohammadi, M. (2025). The global prevalence and associated factors of loneliness in older adults: A systematic review and meta-analysis. Humanities and Social Sciences Communications, 12, Article 985. https://doi.org/10.1057/s41599-025-05304-x

Schroeder, T., Dodds, L., Georgiou, A., Gewald, H., & Siette, J. (2023). Older adults and new technology: Mapping review of the factors associated with older adults' intention to adopt digital technologies. JMIR Aging, 6(1), Article e44564. https://doi.org/10.2196/44564

Sen, K., Prybutok, G., & Prybutok, V. (2022). The use of digital technology for social wellbeing reduces social isolation in older adults: A systematic review. SSM – Population Health, 17, Article 101020. https://doi.org/10.1016/j.ssmph.2021.101020

Shankar, A., McMunn, A., Banks, J., & Steptoe, A. (2011). Loneliness, social isolation, and behavioral and biological health indicators in older adults. Health Psychology, 30(4), 377–385. https://doi.org/10.1037/a0022826

Spreng, R. N., Dimas, E., Mwilambwe-Tshilobo, L., Dagher, A., Koellinger, P., Nave, G., Ong, A., Kernbach, J. M., Wiecki, T. V., Ge, T., Li, Y., Holmes, A. J., Yeo, B. T. T., Turner, G. R., Dunbar, R. I. M., & Bzdok, D. (2020). The default network of the human brain is associated with perceived social isolation. Nature Communications, 11, Article 6393. https://doi.org/10.1038/s41467-020-20039-w

Tomaka, J., Thompson, S., & Palacios, R. (2006). The relation of social isolation, loneliness, and social support to disease outcomes among the elderly. Journal of Aging and Health, 18(3), 359–384. https://doi.org/10.1177/0898264305280993

Tsai, H.-H., Tsai, Y.-F., Wang, H.-H., Chang, Y.-C., & Chu, 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

U.S. Census Bureau. (2026, January 13). National population by characteristics: 2020–2025. https://www.census.gov/data/tables/time-series/demo/popest/2020s-national-detail.html

Wada, K., Shibata, T., Saito, T., & Tanie, K. (2004). Effects of robot-assisted activity for elderly people and nurses at a day service center. Proceedings of the IEEE, 92(11), 1780–1788. https://doi.org/10.1109/JPROC.2004.835378

Welch, V., Ghogomu, E. T., Barbeau, V. I., Dowling, S., Doyle, R., Beveridge, E., Boulton, E., Desai, P., Huang, J., Elmestekawy, N., Hussain, T., Wadhwani, A., Boutin, S., Haitas, N., Kneale, D., Salzwedel, D. M., Simard, R., Hébert, P., & Mikton, C. (2023). Digital interventions to reduce social isolation and loneliness in older adults: An evidence and gap map. Campbell Systematic Reviews, 19(4), Article e1369. https://doi.org/10.1002/cl2.1369

World Health Organization. (2021, July 29). Social isolation and loneliness among older people: Advocacy brief. https://www.who.int/publications/i/item/9789240030749