




A systematic review of interventions for loneliness among older adults living in long-term care facilities

Nicolas G. Quan, Matthew C. Lohman, Nicholas V. Resciniti & Daniela B. Friedman


To cite this article: Nicolas G. Quan, Matthew C. Lohman, Nicholas V. Resciniti & Daniela B. Friedman (2019): A systematic review of interventions for loneliness among older adults living in long-term care facilities, *Aging & Mental Health*, DOI: [10.1080/13607863.2019.1673311](https://doi.org/10.1080/13607863.2019.1673311)


To link to this article: <https://doi.org/10.1080/13607863.2019.1673311>

 [View supplementary material](#) 

 Published online: 11 Oct 2019.

 [Submit your article to this journal](#) 

 Article views: 163

 [View related articles](#) 

 [View Crossmark data](#) 

A systematic review of interventions for loneliness among older adults living in long-term care facilities

Nicolas G. Quan^a, Matthew C. Lohman^{b,c} , Nicholas V. Resciniti^{b,c} and Daniela B. Friedman^{c,d}

^aBiological Sciences, University of South Carolina, Columbia, SC, USA; ^bEpidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, SC, USA; ^cOffice for the Study of Aging, Arnold School of Public Health, University of South Carolina, Columbia, SC, USA; ^dHealth Promotion, Education, and Behavior, Arnold School of Public Health, University of South Carolina, Columbia, SC, USA

ABSTRACT

Objectives: This study aimed to review loneliness interventions for older adults living in long-term care (LTC) facilities over the past 10 years, to categorize interventions by type, and to compare effectiveness of loneliness interventions in these settings.

Methods: Systematic review followed PRISMA guidelines. Articles matching search criteria were collected from PubMed, PsycINFO, and Web of Science from 2009 to 2019. The inclusion criteria were as follows: 1) English language, 2) intervention studies with a quantitative measure that compares pre-trial to post-trial changes, 3) loneliness as a primary or secondary outcome 4) subjects age >65, and 5) subjects living in a LTC facility, such as a nursing home, assisted-living, or hospice.

Results: A total of 15 intervention studies qualified for systematic review. Most of these interventions were psychological therapies and leisure/skill development interventions. Approximately, 87% of studies reported significant decreases in loneliness following intervention. Laughter therapy, horticultural therapy, and reminiscence therapy were associated with the greatest decreases in loneliness.

Discussion: Results suggest that, although less common than interventions in the community, there are several effective interventions to reduce loneliness among older adults living in LTC facilities. Lack of standardized measures and high-quality studies limits comparisons between intervention types and generalizability to different populations.

ARTICLE HISTORY

Received 12 June 2019
Accepted 21 September 2019

KEYWORDS

Loneliness; long-term care facilities; systematic review; older adults

Introduction

Loneliness, defined as ‘a distressing feeling that accompanies the perception that one’s social needs are not being met by the quantity or especially the quality of one’s social relationships (Hawkley & Cacioppo, 2010),’ is a common condition, with significant implications for population health and well-being (Hawkley & Cacioppo, 2010). A nationally representative survey conducted by AARP in 2010 found that 35% of adults 45 and older considered themselves to be lonely (Anderson, 2010). Importantly, a growing body of evidence has begun to document the links between loneliness and negative physical and mental health outcomes (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015; Gardiner, Geldenhuys, & Gott, 2018; Gerst-Emerson & Jayawardhana, 2015; Landeiro, Barrows, Nuttall Musson, Gray, & Leal, 2017; Prieto-Flores, Forjaz, Fernandez-Mayoralas, Rojo-Perez, & Martinez-Martin, 2011). As such, there is increasing recognition of the need to address loneliness to help mitigate its negative consequences.

While loneliness may affect people of all ages, older adults (age 65+) are uniquely vulnerable. Loss of friends and family, widowhood, fewer social connections through work and community groups, and other common experiences of older age may lead to or exacerbate feelings of loneliness. Among older adults living in long-term care (LTC)

facilities, a greater number of chronic health conditions, need for functional assistance, and limited ability to engage in daily activities may further limit the ability to maintain existing social relationships (Pinquart & Sorensen, 2001). Consequently, research suggests that older adults living in LTC facilities have higher rates of loneliness than in the community. A study by Prieto-Flores et al (2011) reported that older adults in nursing homes are two times more likely to be lonely than those living in the community (Prieto-Flores et al., 2011). Similarly, a limited number of studies conducted in Europe have reported that 50–55% of nursing home residents have experienced loneliness (Drageset, Kirkevold, & Espehaug, 2011; Nyqvist, Cattán, Andersson, Forsman, & Gustafson, 2013). However, despite the potentially greater likelihood of loneliness among facility-dwelling older adults, little is known about potential preventive measures for loneliness in this population.

Loneliness negatively impacts both physical and mental health among older adults. It has been linked to greater risk of an array of health problems including high blood pressure, cardiovascular disease, disability, cognitive decline, depression, and early mortality (Gerst-Emerson & Jayawardhana, 2015). For example, a study by Luo et al. found that chronically lonely older adults in the community were nearly two times more likely to die within six years

than older adults who were not lonely (Luo, Hawkey, Waite, & Cacioppo, 2012). Loneliness may also lead to greater healthcare utilization and costs, although evidence is mixed (Flowers et al., 2017; Gerst-Emerson & Jayawardhana, 2015; Valtorta, Moore, Barron, Stow, & Hanratty, 2018). For example, Gerst-Emerson & Jayawardhana (2015) found that chronically lonely older adults were more likely to use physician services than those who did not report chronic loneliness (Gerst-Emerson & Jayawardhana, 2015). However, these differences may be explained, in part, by differences in individual health status (Valtorta et al., 2018). Thus, it remains unclear whether reducing loneliness might be an effective means of reducing health care costs among older adults receiving LTC services.

In recognition of the negative health outcomes associated with loneliness, several interventions to combat loneliness among older adults have been developed (Poscia et al., 2018). Gardiner et al. classify current interventions for loneliness among older people into six categories: social facilitation interventions, psychological therapies, health and social care provision, animal interventions, befriending interventions, and leisure/skill development interventions (Gardiner et al., 2018). Each of these intervention types has been implemented among older adults in the community, with varying degrees of effectiveness (Fokkema & Knipscheer, 2007; Gardiner et al., 2018; Hemingway & Jack, 2013); however, there is little comparative evidence regarding the characteristics or effectiveness of different loneliness reduction approaches in LTC settings. A specific focus on the LTC population is important for at least three reasons. First, failure to distinguish between different older adult populations may obscure important differences that may inform more effective implementation and intervention development. Second, interventions developed for older adults living in the community, such as those based on physical activity or skills development, may not be effective in LTC environments, where residents may have limited mobility, functional abilities, or access to technology. Third, LTC facilities represent points of sustained engagement between older adults and healthcare service providers, which might be leveraged to reduce loneliness. LTC providers and facility staff may play an important role in identifying and managing loneliness, as they come in frequent contact with residents.

Given the potential importance of loneliness reduction to health and well-being among older adults and specific knowledge gaps regarding loneliness interventions in LTC, the current study objectives were to 1) identify interventions to reduce loneliness among older adults living in LTC facilities implemented in the past 10 years, and 2) compare the effectiveness and characteristics of different approaches in these settings. By describing the current state of knowledge and synthesizing intervention trial results, the overall goal of this review was to improve understanding of interventions for loneliness among older adults in facilities to inform future research and practice.

Methods

The following review steps were performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for conducting a

systematic review (Moher, Liberati, Tetzlaff, Altman, & The PRISMA Group, 2009). A systematic search was first conducted using the following databases: PubMed, PsycINFO, and Web of Science using search strategies described in Appendix 1. Studies from the past 10 years (January 2009 to January 2019) were included. This time period was chosen to capture studies that better reflect current practices and structures in LTC and loneliness research. The search was conducted twice, both in October 2018 and in February 2019, to ensure that any articles published after the initial search were included. Appropriate medical subject headings (MeSH) were used along with text word searches and phrases. The predetermined population of interest was adults, age 65 and older living in a LTC facility such as a nursing home, assisted living, or hospice facility. Search terms were chosen to identify interventions with quantitative measures of loneliness, with post-intervention loneliness in intervention groups compared to either a control group or pre-trial loneliness scores. Eligible study designs included randomized controlled trials, quasi-experimental studies, and single-group design studies. The algorithms used in the initial database search are shown in Appendix 1.

The analysis of retrieved studies was conducted in 3 steps, which followed the following inclusion criteria:

- (1) Manuscript must be in the English language;
- (2) Study must describe an intervention with a quantitative comparison of pre-trial and post-trial measures;
- (3) Loneliness must be one of the primary outcomes assessed;
- (4) Greater than 50% of subjects must be age 65 or older;
- (5) The subjects must live in a facility, such as a nursing home, assisted living, or hospice facility. We defined facilities as places where residents received some level of health care or functional support for an extended period (greater than 1 month). Therefore, acute care hospitals and retirement communities that did not provide health services or functional support to residents were not included.

Because the concepts of loneliness and social isolation are sometimes used interchangeably in research literature, studies that used the term 'social isolation' were included in the title and abstract screening steps. Articles measuring only social isolation were excluded in the full text review step if social isolation referred to an objective and quantifiable measure of reduced social network size or lack of social contacts (Steptoe, Shankar, Demakakos, & Wardle, 2013), rather than the subjective concept of loneliness as defined in this and previous studies (Hawkey & Cacioppo, 2010).

Step 1: Title screening

Articles were title screened for inclusion and those that did not meet inclusion criteria were excluded. All articles were title screened by two of the following investigators: NQ, ML, NR. Conflicts were settled by the third investigator or by discussion between the two individuals screening the article.

Step 2: Abstract screening

Articles that passed title screening were uploaded into the systematic review management software Covidence (2019)

and underwent abstract screening, using the inclusion criteria. All articles were screened by two of the following investigators: NQ, ML, NR. Conflicts were settled by the third investigator or by discussion between the two screening the article.

Step 3: Full text review

Full text review was undertaken on articles remaining after title and abstract screening. Articles were excluded for the following reasons: wrong patient population, wrong study design, wrong outcomes, wrong comparator, or for lack of peer review. All the articles were screened by both NQ and ML, and conflicts were settled with discussion between NQ and ML.

Articles that passed full text screening were assessed for methodological quality. As a template for quality assessment, we used two tools from the National Heart, Lung, and Blood Institute Quality Assessment (NHLBI): Quality Assessment of Before and After (Pre-Post) Studies With No Control Group and the Quality Assessment of Controlled Intervention Studies (National Institutes of Health, 2014). These criteria included differences in baseline characteristics between groups, the randomization techniques used for sampling in controlled studies, drop-out rate, adherence to treatment, and other criteria noted in the Supplemental Tables. All studies were assigned a quality rating of Good, Fair, or Poor.

For the final set of included articles, we extracted author information, year of publication, participant information, sample participant characteristics, type of study, follow-up timeline, intervention information, control information, setting, outcome measures, and statistical findings. The principal summary measures recorded were between-group and within-group statistical differences in the change in loneliness between the pre-trial and post-trial stages. Articles were classified following the categorization schema of Gardiner et al. (2018).

Results

Search results

An initial literature search of several journal databases yielded 1858 articles meeting text search criteria. After removing duplicates, 1376 articles underwent title screening (Figure 1). After initial title screening, 80 articles underwent abstract screening. Of the 32 articles remaining after abstract screening, 15 were included after full text screening, representing the total study sample for this review. Additional details of the article search and exclusion process are described in Figure 1.

Of the final 15 articles, five described randomized controlled trials, eight were quasi-experimental, and two were single-group design. Four studies were conducted in Taiwan, four in China, and one in each of the following countries: USA, New Zealand, Italy, Netherlands, Turkey, Egypt and Australia. Almost two-thirds of the studies ($n=9$) had mostly female participants. The majority of facilities were described as nursing homes, followed by assisted-living and residential care facilities. Two of the studies also included participants that were independent, community-dwelling residents.

Individuals with cognitive impairment, as measured by clinical diagnosis or cognitive screening tools such as the Mini Mental State Examination, were excluded from 14 of 15 studies. One study included participants with suggested cognitive impairment ($n=19$, 48%) (Robinson, Macdonald, Kerse, & Broadbent, 2013).

Loneliness measurement strategies

As shown in Table 1, the most commonly used loneliness measure from the 15 studies was the UCLA Loneliness Scale v3, which was used by 11 of the studies in either its original, translated, or shortened forms (Chen & Ji, 2015; Chiang et al., 2010; Robinson et al., 2013; Sollami, Gianferrari, Alfieri, Artioli, & Taffurelli, 2017; Tsai & Tsai, 2011; Tsai, Tsai, Wang, Chang, & Chu, 2010; Tse, 2010; Tse et al., 2010; Tse, Tang, Wan, & Vong, 2014; Tse, Yeung, Lee, & Ng, 2016; Winstead, Yost, Cotten, Berkowsky, & Anderson, 2014). The De Jong Gierveld Loneliness Scale was the second most commonly used scale, with versions used in two studies from Turkey and the Netherlands (Kuru Alici, Zorba Bahceli, & Emiroglu, 2018; Westerhof, Korte, Eshuis, & Bohlmeijer, 2017). Remaining studies used a mix of study-specific or researcher-created loneliness measures (Elsherbiny & Al Maamari, 2018; Travers & Bartlett, 2011).

Other related effectiveness measures commonly used in interventions included well-being, depression, anxiety, physical pain, and social isolation. Most studies tested intervention effectiveness by comparing loneliness scores at baseline and at around eight weeks later. Only two studies included long-term follow-up (greater than 14 weeks), assessing loneliness changes up to five and 12 months post-intervention, respectively (Chiang et al., 2010; Tsai & Tsai, 2011).

Interventions

According to the intervention clustering model proposed by Gardiner et al., we categorized interventions into six types, as shown in Table 1 (Gardiner et al., 2018). The most common intervention type was leisure/skill development (six studies), such as exercise and pain programs, gardening, and radio listening, followed by psychological therapies (five studies), including nostalgic, humorous, and existential types, and by both social facilitation interventions as well as animal support interventions (two studies each). Animal interventions included both real life animals and robot animals. The two intervention categories from the cluster model, health and social care provision and befriending interventions, were not represented in the facility-based interventions.

Quality assessment

Out of the 15 studies, five were rated as 'Good,' representing low risk of bias. In general, these studies included randomized controlled trials with or without blinding of intervention group membership for loneliness assessment. Seven studies, typically those involving quasi-experimental designs or *post hoc* assessment for confounding and bias were given a rating of 'Fair.' Three studies were given a rating of 'Poor.' Poor ratings typically resulted from unclear

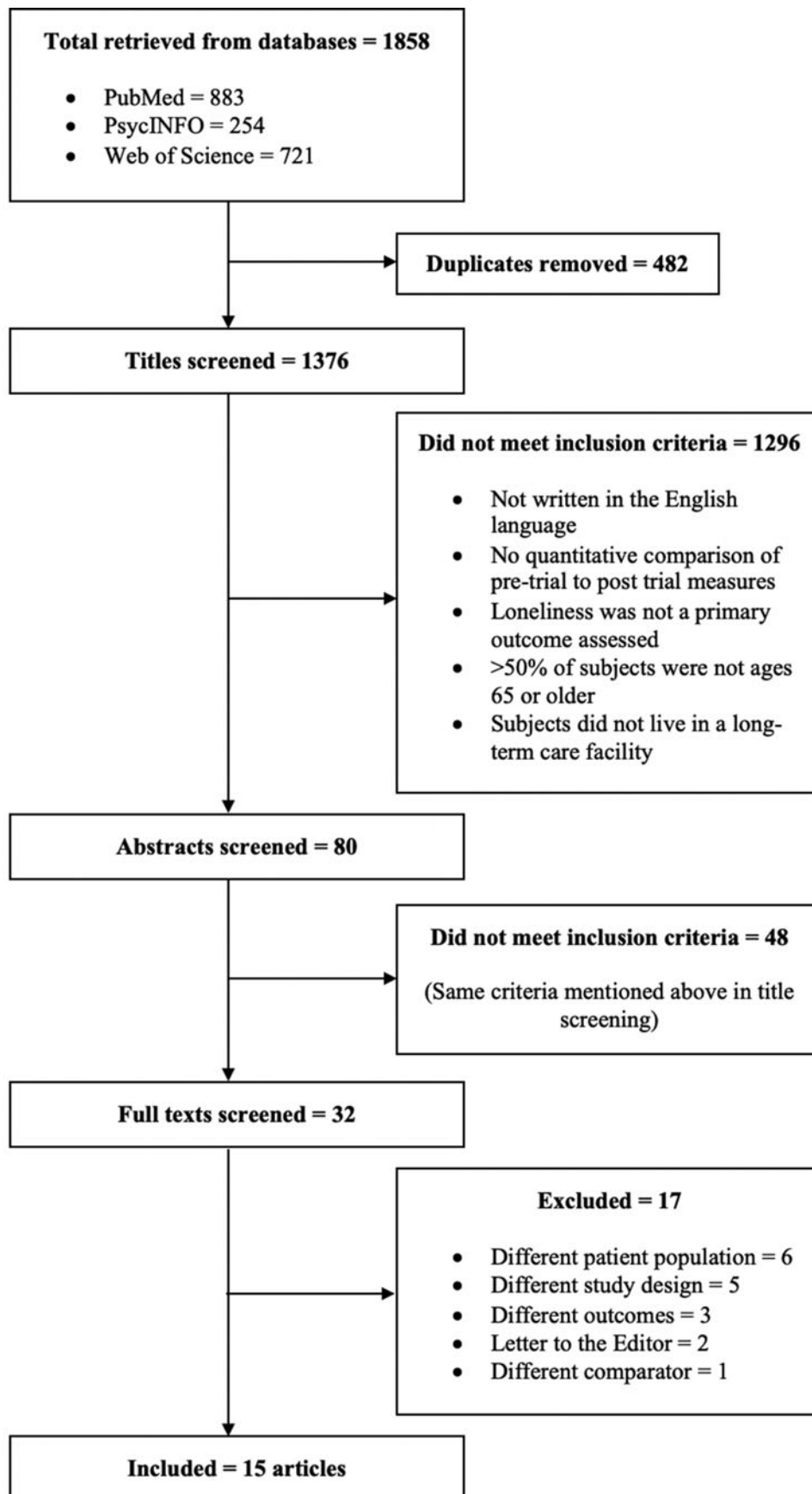


Figure 1. Study flow diagram and search results.

statistical methods, non-experimental study protocols, or otherwise high risk of bias (Supplemental Tables).

Quantitative findings

Thirteen studies reported statistically significant differences in loneliness scores either between pre-trial and post-trial

for the experimental group, or between experimental and control groups at post-trial (Table 2). While these were statistically significant changes, absolute loneliness score changes in most studies were modest, ranging from approximately 3.6% to 25% decreases in loneliness in the intervention groups at follow-up (Table 2). The study

Table 1. Intervention Categorizations according to Gardiner et al. (2018).

Type of intervention	Description
Social facilitation interventions Psychological therapies	<ul style="list-style-type: none"> • Video conferencing (Tsai & Tsai, 2011; Tsai et al., 2010) • Reminiscence therapy (Chiang et al., 2010) • Autobiographical memory intervention (Westerhof et al., 2017) • Humor therapy (Mimi M Y Tse et al., 2010) • Laughter therapy (Kuru Alici et al., 2018) • Logotherapy (Elsherbiny & Al Maamari, 2018)
Health and social care provision Animal interventions	N/A <ul style="list-style-type: none"> • Pet therapy (Sollami et al., 2017) • Paro companion robot interaction (Elsherbiny & Al Maamari, 2018)
Befriending interventions Leisure/skill development interventions	N/A <ul style="list-style-type: none"> • Physical exercise training (Tse et al., 2014) • Indoor gardening participation (Tse, 2010) • Pain management program (Tse et al., 2016) • Participation in activities (Winstead et al., 2014) • Horticultural therapy (Chen & Ji, 2015) • Reminiscent radio listening (Travers & Bartlett, 2011)

Reminiscence therapy consisted of a group therapy class, whereas reminiscient radio listening was comprised of individuals listening to a radio program on their own time (Chiang et al., 2010; Travers & Bartlett, 2011).

reporting the largest difference in loneliness scores between pre- and post-intervention was the laughter therapy intervention, which showed a greater than 50% decrease in loneliness among intervention group participants using the De Jong Gierveld Loneliness Scale for the experimental group (pre-trial mean = 17.95, SD = 2.704, $n=20$; post-trial mean = 7.15, SD = 1.755, $n=20$) (Kuru Alici et al., 2018). This decrease was found to be significantly greater than the decrease in the control group (pre-trial mean = 16.77, SD = 3.51, $n=30$; post-trial mean = 15.63, SD = 5.027, $n=30$) (Kuru Alici et al., 2018). Two studies involving participation in general activities and reminiscient radio listening program reported no statistically significant differences in loneliness following intervention (Travers & Bartlett, 2011; Winstead et al., 2014).

Because nine of the 15 studies measured loneliness using the full UCLA Loneliness Scale v3, they can be best compared. According to the UCLA Scale, the greatest mean decreases in loneliness from pre-trial to post-trial were found for reminiscence therapy and horticultural therapy, with mean decreases of 7.24 and seven points, respectively (Chen & Ji, 2015; Chiang et al., 2010). The smallest mean decreases came from the physical exercise program, with a mean decrease of 1.49 (Tse et al., 2014). Disregarding differences in sample sizes and standard deviations, the mean decrease in UCLA Loneliness Scale v3 score over all of the nine studies was 4.61 from pre-trial to post-trial.

Discussion

The purpose of this research was to compile and review existing literature on interventions for loneliness among older adults living in LTC facilities from 2009 to 2019, and to develop a greater understanding of effective intervention features. Our search identified 15 studies, with a wide variety of intervention designs, study quality, settings, and sample characteristics. We found that psychological therapies and leisure/skill development interventions were the most common interventions in LTC facility settings. While variability in study design and measures used to assess loneliness limited comparisons of effectiveness across studies, the majority of interventions (approximately 87%) were successful in reducing loneliness over time, with laughter therapy, reminiscence therapy, and horticultural therapy reporting the greatest absolute decreases in loneliness

scores. These findings have implications for the design and tailoring of interventions to decrease loneliness in LTC and other specialized health care facilities.

By specifically focusing on interventions for loneliness reduction in facilities, this study extends findings from prior research and reviews regarding loneliness reduction approaches for older adults (Cohen-Mansfield & Perach, 2015; Gardiner et al., 2018; MacLeod et al., 2018; O'Rourke, Collins, & Sidani, 2018; Poscia et al., 2018; Stojanovic et al., 2017). In general, our findings are consistent with previous studies focused on both community-dwelling and facility-dwelling older adults. For instance, a review by Cohen-Mansfield and Perach, of 34 studies, with 23 conducted among community-dwelling older adults and eight conducted among older adults living in facilities, found that interventions for community dwelling older adults and those in LTC shared similar characteristics and designs (Cohen-Mansfield & Perach, 2015). As in the current review, loneliness interventions in the community consisted primarily of instructional group bonding activities, educational lessons, and skills development (Cohen-Mansfield & Perach, 2015; Poscia et al., 2018; Stojanovic et al., 2017). Unlike previous work focused on community-dwelling older adults (Khosravi, Rezvani, & Wiewiora, 2016; Poscia et al., 2018), we found little use of mHealth, computer, or internet-based interventions in LTC. As several such approaches have been shown to reduce loneliness in older adults (Khosravi et al., 2016), it is unclear why few LTC interventions incorporated these strategies, but possible explanations include perception of poor technological literacy among LTC residents, limited resources, or even lack of knowledge regarding these strategies among LTC staff (Khosravi et al., 2016). More studies regarding technology-based interventions in LTC are needed to draw conclusions about their relative effectiveness.

Contrary to the present study, previous reviews of community-based interventions found that fewer interventions were effective at reducing loneliness (Cohen-Mansfield & Perach, 2015; Poscia et al., 2018). For instance, two previous reviews by Cohen-Mansfield and Perach (2015) and Poscia et al. (2018) reported respectively that 21.7% and 66.7% of community-based interventions successfully reduced loneliness (Cohen-Mansfield & Perach, 2015; Poscia et al., 2018). In conjunction with findings from the current study, in which a majority (87%) of facility-based interventions

Table 2. Systematic extraction table and intervention characteristics.

Author, year	Participants	Sample characteristics	Type of Study	Follow-up	Intervention	Control	Setting	Outcome measure	Findings	Numerical results	Quality assessment
Robinson et al. (2013)	Older residents from the Selwyn Heights retirement home in Hillsborough, Auckland, New Zealand	3/4 women, ages 55–100 for both intervention and control group	RCT	12 weeks	[Paro companion robot interaction]: On two weekday afternoons for 12 weeks, group discussions were held where experimental group participants all had the chance to interact with the Paro robot.	Bus trips, crafts, movies, bingo	Hillsborough, Auckland, New Zealand	UCLA Loneliness Scale v3	After adjusting for baseline loneliness scores, a significant difference between experimental and control group loneliness scores was found with $p = 0.033$.	[Baseline] Experimental: Mean = 36.44, SD = 9.76, $n = 20$ Control: Mean = 31.71, SD = 9.5, $n = 20$ [12 Weeks] Experimental: Mean = 32.23, SD = 9.92, $n = 17$ Control: Mean = 33.93, SD = 8.52, $n = 17$	Good
Chiang et al. (2010)	Nursing home in Taipei area and (1) conscious and able to speak Mandarin or Taiwanese, (2) aged 65 years or over, and (3) the MMSE score was greater than 20	All males, mean age was 77.24	RCT	2 months, 5 months	[Reminiscence therapy]: Structured 90 min/week discussion sessions focused on the recall and sharing memories, as well as better expressing one's feelings.	Waiting List	Taipei, Taiwan	UCLA Loneliness Scale v3	A significant difference in the feeling of loneliness was found between groups with $z = -27.26$, $p < 0.0001$; $z = -22.75$, $p < 0.0001$.	[Baseline] Experimental: Mean = 42.24, SD = 7.37, $n = 45$ Control: Mean = 42, SD = 8.04, $n = 45$ [5 months] Experimental: Mean = 35, SD = 7.16, $n = 45$ Control: Mean = 42.09, SD = 7.93, $n = 47$	Good
Sollami et al. (2017)	Older residents from a nursing home in Italy	Mean age around 85 for both intervention and control group	RCT	8 weeks	[Pet therapy]: 2 times a week, participants spent 1 hour in a group with a pet therapy dog.	Residents receiving usual services	Residents receiving Italy	UCLA Loneliness Scale v3	In the intervention group, loneliness had a significant improvement, with a mean decrease from 50 to 44.43 in the UCLA Loneliness Scale v3 from pre to post trial. This was a change of -5.57 with $p = 0.001$.	[Baseline] Experimental: Mean = 50, SD = 5.64, $n = 14$ [8 Weeks] Experimental: Mean = 44.43, SD = 2.71, $n = 14$ [Change between pre- and post-trial] Experimental: Mean = 5.57, SD = 3.65, $n = 14$ Control: Mean = 2.86, SD = 1.75, $n = 14$	Poor
Westerhof et al. (2017)	LTC facility residents	62% female, mean age around 84 for both groups	RCT	8 weeks	[Autobiographical memory intervention]: For five 45-minute sessions over 8 weeks, intervention participants discussed positive memories from childhood, adolescence, and adulthood with a volunteer.	Each participant would do unstructured activities with their volunteer, such as conversing or playing cards.	Netherlands	De Jong Gierveld 11-Point Loneliness Scale	Loneliness decreased in both intervention and control groups. Significant within-subject contrasts were found at the post-intervention ($F(1,79) = 7.4$; $p = .008$) and follow-up ($F(1,79) = 13.0$; $p = .001$).	[Baseline] Experimental: Mean = 3.2, SD = 2.7, $n = 42$ Control: Mean = 4.4, SD = 5.2, $n = 39$ [8 months] Experimental: Mean = 2.4, SD = 3.1, $n = 28$ Control: Mean = 3.4, SD = 3.9, $n = 23$	Good
Tse et al. (2014)	Nursing home residents from 10 nursing homes in	55% male, mean age around 85, for both groups	RCT	8 weeks	[Physical exercise training]: For an hour a week for 8 weeks,	Residents receiving usual services	Residents receiving Hong Kong, China	UCLA Loneliness Scale v3	The score changes in loneliness was more significant in the	[Baseline] Experimental: Mean = 40.98, SD = 11.77,	Good

(continued)

Table 2. Continued.

Author, year	Participants	Sample characteristics	Type of Study	Follow-up	Intervention	Control	Setting	Outcome measure	Findings	Numerical results	Quality assessment
Tsai et al. (2010)	Hong Kong, China, musculoskeletal pain in the past 6 months	58% female, mean age around 74 for both groups	Quasi-experimental Study	1 week, 3 months	Intervention participants took part in a physical exercise program led by a physiotherapist and research assistants. [Video conferencing]: For 3 months, intervention group participants received >=5 minutes a week of videoconference interaction with family members.	No video conference interaction	Taiwan	UCLA Loneliness Scale v3	The changes in UCLA Loneliness Scale v3 scores for the intervention group at 12 months was -6.42 with $p < 0.01$. The change was significantly lower than for the comparison group with changes of 2.77, with p value=0.2.	Control $n = 225$ Mean = 40.17, SD = 11.8, $n = 171$ [8 weeks] Experimental Mean = 39.49, SD = 10.52, $n = 225$ Control Mean = 40.41, SD = 12.6, $n = 171$ [Baseline] Experimental Mean = 50.58, SD = 11.16, $n = 21$ Control Mean = 46.55, SD = 9.07, $n = 28$ [3 months] Experimental Mean = 47.33, SD = 13.5, $n = 21$ Control Mean = 46.68, SD = 9.08, $n = 28$	Good
Tsai and Tsai (2011)	Nursing home residents from 16 different nursing homes in Taiwan	55% women, mean age around 74 for both groups	Quasi-experimental Study	3 months, 6 months, 12 months	[Video conferencing]: For 3 months, intervention group participants received >=5 minutes a week of videoconference interaction with family members, with the help of a research assistant.	No video conference interaction	Taiwan	UCLA Loneliness Scale v3	The changes in the mean UCLA Loneliness Scale v3 scores were significantly different for intervention groups at one week (-1.21, $p = 0.02$) and three months (-2.84, $p = 0.03$).	Control Mean = 46.68, SD = 9.08, $n = 28$ [Baseline] Experimental Mean = 49.7, SD = 10.25, $n = 40$ Control Mean = 45.76, SD = 9.73, $n = 50$ [12 months] Experimental Mean = 45.92, SD = 12.14, $n = 40$ Control Mean = 48.32, SD = 10.17, $n = 50$	Fair
Tse et al. (2010)	One nursing home as experimental group, another as control group	54% women, mean age around 79 for both groups	Quasi-experimental Study	8 weeks	[Humor therapy]: For an hour a week for 8 weeks, researchers read jokes and stories, lectured on humor research, and gave mindfulness tips for humor. Participants completed laughing exercises and games as well.	Residents receiving usual services	China	UCLA Loneliness Scale v3	A significant difference in loneliness was found between baseline and post-intervention for the intervention group with $p = 0.001$. No difference was found between intervention and control group $p = 0.096$ at the $p < 0.5$ level.	Control Mean = 39.44, SD = 7.96, $n = 36$ [8 weeks] Experimental Mean = 39.44, SD = 7.96, $n = 36$ Control Mean = 42.85, SD = 8.92, $n = 34$	Fair

(continued)

Table 2. Continued.

Author, year	Participants	Sample characteristics	Type of Study	Follow-up	Intervention	Control	Setting	Outcome measure	Findings	Numerical results	Quality assessment
Tse (2010)	Nursing home residents from 4 nursing homes in Hong Kong, China	85% female, mean age around 85 for both groups	Quasi-experimental Study	8 weeks	[Indoor gardening participation]: Once a week for 8 weeks, intervention participants wrote in a planting diary, positioned and watered plants, made natural pesticides and discussed gardening skills.	Residents receiving usual services	Hong Kong, China	UCLA Loneliness Scale v3	There was a statistically significant difference between the intervention and control groups with $p < 0.05$.	[Baseline] Experimental Mean = 41.38, SD = 8.18, $n = 26$ Control Mean = 42.56, SD = 2.8, $n = 27$ [8 weeks] Experimental Mean = 35.46, SD = 7.54, $n = 26$ Control Mean = 42.44, SD = 2.98, $n = 27$	Fair
Tse et al. (2016)	Nursing home residents from 2 nursing homes	Majority female participants, mean age around 85 for both groups	Quasi-experimental Study	12 weeks	[Pain management program participation]: For two one-hour sessions a week for 12 months, intervention participants took part in peer-led pain management classes, which included physical exercise, interactive teaching and sharing of pain management education.	A weekly one-hour session of a pain management program, not peer led	China	Chinese version of UCLA Loneliness Scale	Mean loneliness score dropped from 44.5 ± 8.7 to 34.3 ± 8.3 for the experimental group $p < 0.001$. Control group mean score dropped from 42.8 ± 10.5 to 38.9 ± 9.8 with $p = 0.031$.	Experimental Mean = 44.5, SD = 8.7, $n = 32$ Control Mean = 42.8, SD = 10.5, $n = 18$ [8 weeks] Experimental Mean = 34.8, SD = 8.3, $n = 32$ Control Mean = 38.9, SD = 9.8, $n = 18$	Fair
Kuru Alici et al. (2018)	Older residents age 50 or older from two nursing homes in Ankara Turkey	Slightly over half were women, around 2/3 were ages 65-75	Quasi-experimental Study	5 weeks	[Laughter therapy]: For two 1-hour sessions a week for 12 months, intervention participants took part in peer-led pain management classes, which included physical exercise, interactive teaching and sharing of pain management education.	Residents receiving usual services	Ankara, Turkey	De Jong Gierveld Loneliness Scale	With $p < 0.001$, a statistically significant difference was found between mean DJGLS scores of the intervention (7.15 ± 1.755) and control groups (15.63 ± 5.027) after the intervention.	[Baseline] Experimental Mean = 17.95, SD = 2.704, $n = 20$ Control Mean = 16.77, SD = 3.51, $n = 30$ [5 weeks] Experimental Mean = 7.15, SD = 1.755, $n = 20$ Control Mean = 15.63, SD = 5.027, $n = 30$	Fair
Elsherbiny and Al Maamari (2018)	Private elderly care institution in Egypt	Around 2/3 were male, mean age around 68 for both groups	Quasi-experimental Study	12 weeks, 14 weeks (follow up)	[Logotherapy]: 24 group intervention sessions, lasting 20-30 minutes each and 3 counselling interviews per participant, lasting 30-45 minutes. The intervention consisted of various activities to instill participants with meaning, including personal interests, friendships and internet training.	Residents receiving usual services	Egypt	Perceived Isolation Scale (Cornwell and Waite 2009)	A significant difference was found between intervention and control groups after the intervention with $t = 4.76$. During follow up, the two groups also showed a significant difference at $\alpha = 0.05$, with $t = 4.13$.	[Baseline t-score between experimental and control] $T = 0.81$, $n = 22$ for experimental, $n = 22$ for control [14 weeks t-score between experimental and control] $T = 4.13$, $n = 21$ for experimental, $n = 22$ for control	Fair

(continued)

Table 2. Continued.

Author, year	Participants	Sample characteristics	Type of Study	Follow-up	Intervention	Control	Setting	Outcome measure	Findings	Numerical results	Quality assessment
Winstead et al. (2014)	Assisted and independent living residents	N/A	Quasi-experimental Study	8 weeks	[Participation in activities]: Participation in activities weekly over 8 weeks.	No activity participation	USA	3-item UCLA Loneliness Scale	No significant differences were found in loneliness scores pre-post trial or between groups.	[Baseline] Experimental Mean = 4.08, SD = 1.4, n = 104 Control Mean = 4.14, SD = 1.31, n = 37	Poor
Chen and Ji (2015)	Older residents from a nursing home in Taichung	60% were men, mean age was 75.3	Single-Group Design	5 weeks, 10 weeks	[Horticultural therapy]: Gardening for 1.5 hours a week, consisting of planting seeds, propagating plants, cooking using plants, learning plant care techniques, and using plants to decorate for holidays.	No control group	Taichung, Taiwan	UCLA Loneliness Scale v3	The loneliness score decreased from 42.9 (SD = 9.26) at baseline to 34.2 (SD = 7.54) at 5 weeks and then to 35.9 (SD = 6.08) at 10 weeks with p < 0.001.	[Baseline] Experimental Mean = 4.27, SD = 1.48, n = 37 Control Mean = 4.29, SD = 9.26, n = 10	Fair
Travers and Bartlett (2010)	Community-dwelling older adults and care facility residents	70% women, mean age around 80	Single-Group Design	3 months	[Reminiscent radio listening]: For an hour a day for 3 months participants listened to the Silver Memories radio station, a station that mostly plays music, as well as serials and other segments of radio programs that were popular in the 1920–1950s.	No control group	Brisbane, Australia	Single-Question Item	No significant change in the loneliness question before and after intervention, with z = -1.27, and p = 0.2.	No change on the loneliness question (Z = -1.27, p = 0.2)	Poor

reported significant reductions in loneliness, these findings suggest that loneliness interventions in facilities can be at least as effective in LTC facilities as in the community. There are several possible explanations for the success of LTC-based interventions. First, these results may reflect inherent advantages of facility-based implementation, such as ability to develop engagement with health service professionals employed by facilities, as well as opportunities for group activities and social connections among residents. As others have noted, loneliness intervention effectiveness is bolstered by tailoring to a target population (Stojanovic et al., 2017), and LTC settings may offer fewer barriers to customization than in the community. An alternative explanation for high success rates in contemporary facility-based interventions is that study populations were not representative of older adults in LTC. For instance, 14 of 15 reviewed studies excluded individuals with some level of cognitive impairment. Because cognitive impairment is associated with greater loneliness (Cacioppo & Hawkley, 2009; Shankar, McMunn, Banks, & Steptoe, 2011) and may be a barrier to effectiveness, study results in LTC facilities may reflect some bias in the selection of participants. Studies including participants with greater physical and cognitive limitations are thus needed to evaluate whether loneliness interventions can be effective with a more general and representative older adult population.

This study provides a more thorough understanding of the components of successful loneliness interventions for facility-dwelling older adults. In the facility-dwelling population, decreases in mobility and greater health concerns may lead to fewer social relationships, which may lead to increased feelings of loneliness (Pinquart & Sorensen, 2001). Consistent with this idea, the most successful interventions included in this study were those that did not rely on significant physical activity or mobility. For instance, participants in horticultural, laughter, and reminiscence therapies, which allow formation and maintenance of social relationships through group activities within facility settings (Chen & Ji, 2015; Chiang et al., 2010; Kuru Alici et al., 2018), demonstrated the greatest decreases in loneliness over time. Similarly, video conferencing interventions were found to reduce loneliness modestly among nursing home residents. Such interventions may act by allowing older adults to sustain social relationships with family and friends, without the need for physical exercise or travel (Stojanovic et al., 2017). In most studies we reviewed, it was unclear if such factors or adaptations were considered in the intervention development process. Future development of interventions and strategies to reduce loneliness in LTC facilities should be guided by considerations of the unique challenges in these settings (Stojanovic et al., 2017). This should include the use of more technology-based interventions shown to be effective among older adults (Khosravi et al., 2016; Poscia et al., 2018) and inclusion of more representative patient populations. Despite shortcomings, these findings indicate that a variety of intervention strategies may be effective in LTC, and so greater utilization of loneliness interventions in these facilities, in general, is warranted (Mann et al., 2017).

This study found significant variability in the measures used to define and estimate loneliness. The lack of a consensus definition of loneliness limits comparisons and

generalizability of findings across different countries, cultures, and even residential populations (Lykes & Kimmelmeier, 2014; Rokach, Orzeck, & Neto, 2004). Although the measures used to assess loneliness in LTC were primarily those developed for use in the community, it is unclear whether interpretations of loneliness differ between facility-dwelling and community-dwelling older adults, or whether they view loneliness as distinct from 'social isolation' or other related concepts. The variability in loneliness measures suggests a need for better understanding, not only of cultural differences in the interpretation of loneliness, but differences according to residential context (Russell, 2009).

This review had limitations. There was considerable variability of study design, loneliness measures, and sample sizes. This limited our ability to estimate a pooled measure of effectiveness across multiple interventions or to quantitatively compare overall effectiveness between facility- and community-based interventions. Likewise, the variability of intervention types limited our ability to quantitatively evaluate the specific components of the interventions associated with greater or lesser loneliness reduction and so our conclusions regarding optimal features of interventions remain speculative. Lastly, due to limitations of the software used during study screening, we were unable to quantitatively assess reviewer agreement during title and abstract screening. Despite these limitations, strengths included the rigorous search strategy and data-extraction approach, and use of an intervention clustering classification method (Gardiner et al., 2018). These methods allowed for synthesis of findings from multiple intervention and facility types.

In conclusion, the results of this review suggest that despite the inherent challenges of addressing loneliness among older adults in facilities, successful strategies have been developed in a diverse set of settings and populations. The findings demonstrate that, for the most part, current loneliness interventions are effective at reducing loneliness among LTC residents. This may have important implications for the treatment and prevention of loneliness among older adults and may be of particular interest to administrators and other health professionals looking to reduce loneliness among their patients or residents. Our results also suggest that certain types of interventions are particularly effective, indicating that these may be more appropriate in facility settings, where older adults may have greater medical burden, reduced mobility, and potentially less access to technology. Further research about the specific challenges and issues of loneliness intervention implementation in LTC is necessary.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Matthew C. Lohman  <http://orcid.org/0000-0002-2273-2160>

References

- Anderson, G. O. (2010). *Loneliness among older adults: A national survey of adults 45+*. Washington, DC: AARP Research.
- Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences*, 13(10), 447–454.

- Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science, 10*(2), 238–249.
- Chen, Y.-M., & Ji, J.-Y. (2015). Effects of horticultural therapy on psychosocial health in older nursing home residents: A preliminary study. *Journal of Nursing Research, 23*(3), 167–171.
- Chiang, K.-J., Chu, H., Chang, H.-J., Chung, M.-H., Chen, C.-H., Chiou, H.-Y., & Chou, K.-R. (2010). The effects of reminiscence therapy on psychological well-being, depression, and loneliness among the institutionalized aged. *International Journal of Geriatric Psychiatry, 25*(4), 380–388.
- Cohen-Mansfield, J., & Perach, R. (2015). Interventions for alleviating loneliness among older persons: A critical review. *American Journal of Health Promotion, 29*(3), e109–25.
- Cornwell, E. Y., & Waite, L. J. (2009). Measuring social isolation among older adults using multiple indicators from the NSHAP study. *Journals of Gerontology - Series B Psychological Sciences and Social Sciences, 64*(SUPPL.1), 138–146.
- Drageset, J., Kirkevold, M., & Espehaug, B. (2011). Loneliness and social support among nursing home residents without cognitive impairment: A questionnaire survey. *International Journal of Nursing Studies, 48*(5), 611–619.
- Elsherbiny, M. M. K., & Al Maamari, R. H. (2018). The effectiveness of logotherapy in mitigating the social isolation of neglected institutionalized older people. *The British Journal of Social Work, 48*(4), 1090–1108.
- Flowers, L., Houser, A., Noel-Miller, C., Shaw, J., Bhattacharya, J., Schoemaker, L., & Farid, M. (2017). Medicare spends more on socially isolated older adults.
- Fokkema, T., & Knipscheer, K. (2007). Escape loneliness by going digital: A quantitative and qualitative evaluation of a Dutch experiment in using ECT to overcome loneliness among older adults. *Aging & Mental Health, 11*(5), 496–504.
- Gardiner, C., Geldenhuys, G., & Gott, M. (2018). Interventions to reduce social isolation and loneliness among older people: An integrative review. *Health & Social Care in the Community, 26*(2), 147–157.
- Gerst-Emerson, K., & Jayawardhana, J. (2015). Loneliness as a public health issue: The impact of loneliness on health care utilization among older adults. *American Journal of Public Health, 105*(5), 1013–1019.
- Hawkey, L. C., & Cacioppo, J. T. (2010). Loneliness matters: A theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine, 40*(2), 218–227.
- Hemingway, A., & Jack, E. (2013). Reducing social isolation and promoting well being in older people. *Quality in Ageing and Older Adults, 14*(1), 25–35.
- Khosravi, P., Rezvani, A., & Wiewiora, A. (2016). The impact of technology on older adults' social isolation. *Computers in Human Behavior, 63*, 594–603.
- Kuru Alici, N., Zorba Bahceli, P., & Emiroglu, O. N. (2018). The preliminary effects of laughter therapy on loneliness and death anxiety among older adults living in nursing homes: A nonrandomised pilot study. *International Journal of Older People Nursing, 13*(4), e12206.
- Landeiro, F., Barrows, P., Nuttall Musson, E., Gray, A. M., & Leal, J. (2017). Reducing social isolation and loneliness in older people: A systematic review protocol. *BMJ Open, 7*(5), e013778.
- Luo, Y., Hawkey, L. C., Waite, L. J., & Cacioppo, J. T. (2012). Loneliness, health, and mortality in old age: A national longitudinal study. *Social Science & Medicine (1982), 74*(6), 907–914.
- Lykes, V. A., & Kemmelmeier, M. (2014). What predicts loneliness? Cultural difference between individualistic and collectivistic societies in Europe. *Journal of Cross-Cultural Psychology, 45*(3), 468–490.
- MacLeod, S., Musich, S., Parikh, R. B., Hawkins, K., Keown, K., & Yeh, C. S. (2018). Examining approaches to address loneliness and social isolation among older adults. *Journal of Aging and Geriatric Medicine, 02*(01), 1–8.
- Mann, F., Bone, J. K., Lloyd-Evans, B., Frerichs, J., Pinfold, V., Ma, R., ... Johnson, S. (2017). A life less lonely: The state of the art in interventions to reduce loneliness in people with mental health problems. *Social Psychiatry and Psychiatric Epidemiology, 52*(6), 627–638.
- Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7), e1000097.
- National Institutes of Health. (2014). Study Quality Assessment Tools | National Heart, Lung, and Blood Institute (NHLBI). Retrieved February 17, 2019, from National Institutes of Health website: <https://www.nhlbi.nih.gov/health-topics/study-quality-assessment-tools>.
- Nyqvist, F., Cattan, M., Andersson, L., Forsman, A. K., & Gustafson, Y. (2013). Social capital and loneliness among the very old living at home and in institutional settings. *Journal of Aging and Health, 25*(6), 1013–1035.
- O'Rourke, H. M., Collins, L., & Sidani, S. (2018). Interventions to address social connectedness and loneliness for older adults: A scoping review. *BMC Geriatrics, 18*, 1–13.
- Pinquart, M., & Sorensen, S. (2001). Influences on Loneliness in Older Adults: A Meta-Analysis. *Basic and Applied Social Psychology, 23*(4), 245–266.
- Poscia, A., Stojanovic, J., La Milia, D. I., Duplaga, M., Grysztar, M., Moscato, U., ... Magnavita, N. (2018). Interventions targeting loneliness and social isolation among the older people: An update systematic review. *Experimental Gerontology, 102*, 133–144.
- Prieto-Flores, M.-E., Forjaz, M. J., Fernandez-Mayoralas, G., Rojo-Perez, F., & Martinez-Martin, P. (2011). Factors associated with loneliness of noninstitutionalized and institutionalized older adults. *Journal of Aging and Health, 23*(1), 177–194.
- Robinson, H., Macdonald, B., Kerse, N., & Broadbent, E. (2013). The psychosocial effects of a companion robot: A randomized controlled trial. *Journal of the American Medical Directors Association, 14*(9), 661–667.
- Rokach, A., Orzeck, T., & Neto, F. (2004). Coping with loneliness in old age: A cross-cultural comparison. *Current Psychology, 23*(2), 124–137.
- Russell, D. (2009). Living arrangements, social integration, and loneliness in later life: The case of physical disability. *Journal of Health and Social Behavior, 50*(4), 460–475.
- 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.
- Sollami, A., Gianferrari, E., Alfieri, M., Artioli, G., & Taffurelli, C. (2017). Pet therapy: An effective strategy to care for the elderly? An experimental study in a nursing home. *Acta Bio-Medica: Atenei Parmensis, 88*(15), 25–31.
- 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*(15), 5797–5801.
- Stojanovic, J., Collamati, A., Mariusz, D., Onder, G., Milia, D. I., La Ricciardi, W., ... Oscia, A. (2017). Decreasing loneliness and social isolation among the older people: Systematic search and narrative review. *Epidemiology, Biostatistics and Public Health, 14*(2), 1–8.
- Travers, C., & Bartlett, H. P. (2011). Silver Memories: Implementation and evaluation of a unique radio program for older people. *Aging & Mental Health, 15*(2), 169–177.
- 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), e93–384.
- 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.
- Tse, M. (2010). Therapeutic effects of an indoor gardening programme for older people living in nursing homes. *Journal of Clinical Nursing, 19*(7-8), 949–958.
- Tse, M., Lo, A., Cheng, T., Chan, E., Chan, A., & Chung, H. (2010). Humor therapy: Relieving chronic pain and enhancing happiness for older adults. *Journal of Aging Research, 2010*, 1.
- Tse, M., Tang, S., Wan, V., & Vong, S. (2014). The effectiveness of physical exercise training in pain, mobility, and psychological well-being of older persons living in nursing homes. *Pain Management Nursing, 15*(4), 778–788.
- Tse, M., Yeung, S., Lee, P., & Ng, S. (2016). Effects of a peer-led pain management program for nursing home residents with chronic pain: A pilot study. *Pain Medicine, 17*(9), 1648–1657.
- Valtorta, N. K., Moore, D. C., Barron, L., Stow, D., & Hanratty, B. (2018). Older adults' social relationships and health care utilization: A systematic review. *American Journal of Public Health, 108*(4), e1–e10.
- Westerhof, G. J., Korte, J., Eshuis, S., & Bohlmeijer, E. T. (2017). Precious memories: A randomized controlled trial on the effects of an autobiographical memory intervention delivered by trained volunteers in residential care homes. *Aging & Mental Health, 22*(11), 1494–1501.
- Winstead, V., Yost, E. A., Cotten, S. R., Berkowsky, R. W., & Anderson, W. A. (2014). The impact of activity interventions on the well-being of older adults in continuing care communities. *Journal of Applied Gerontology, 33*(7), 888–911.