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Social connection in long-term care homes: A scoping review of published research on the mental health impacts and strategies to address social connection for residents during COVID-19

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ABSTRACT

Background and Objectives: Good social connection is associated with better physical and mental health and wellbeing. However, the concepts of social connection and strategies to address them have distinct considerations for people living in long-term care (LTC) homes; LTC residents are typically older and have complex health needs that can impact social connection, yet they live in congregate settings and receive daily care from staff (and often family) as well as group social and recreational programming. The objective of this scoping review is to summarize research literature linking social connection to mental health outcomes, specifically among LTC residents, as well as observational and interventional research that might identify strategies to build and maintain social connection in this population during COVID-19 or other disease outbreaks.

Research Design and Methods: We conducted a scoping review of published, English-language research that quantified some aspect of social connection among LTC residents. Our search was conducted in July 2019 and included MEDLINE(R) ALL, CINAHL (EBSCO), PsycINFO (Ovid), Scopus, Sociological Abstracts (Proquest), Embase and Embase Classic (Ovid), Emcare Nursing (Ovid) and AgeLine (EBSCO). For this analysis, we included studies that reported either: (1) the association between social connection and a mental health outcome; (2) the association between a modifiable risk factor and social connecton; or (3) results of intervention study (randomized and non-randomized) where the outcome was any measure of social connection.

Results: We included 128 studies in our review. We found 61 studies that tested an association between social connection and a mental outcome health, including depression; responsive behaviours (e.g., physical and verbal expressions); mood, affect and emotions; cognitive decline; and, other mental health outcomes. We identified twelve strategies from the research literature that our team highlighted to build and maintain social connection for LTC residents and that could be adapted by LTC staff, families and residents in the context of COVID-19 or other disease outbreaks; there were 23 observational and 44 intervention studies that assessed some measure of social connection as an outcome and informed these strategies.

Discussion and Implications: Published research conducted among LTC residents have linked social connection to mental health outcomes, but many studies were limited by cross-sectional design or analyses that did not account for potential confounding. Observational and intervention studies provide some evidence on approaches to address social connection in this population, but further research is needed in this area and, in particular, for residents with cognitive impairment and testing sex-specific associations. In the meantime, our findings highlight twelve strategies that might help LTC staff, families and residents build and maintain social connection for residents.

BACKGROUND AND OBJECTIVES

Coronavirus (COVID-19) has taken a disproportionate toll on people living in long-term care (LTC) homes; residents of LTC homes make up the majority the COVID-19 deaths in Canada and the case fatality rate is roughly 25%.(1) Infection control measures enacted to protect LTC residents from COVID-19, such as prohibiting visitors and restricting activities and interactions with staff and other residents, may have reduced risk of infection but they have also impacted social connection for residents. Social connection is good for health and well-being(2-4) and important to quality of life in LTC homes.(5-7) How have these measures affected the mental health of people living in LTC homes? And what can be done about it now as well as to prepare for future outbreaks?

To address these questions, it is important to acknowledge the nature and influence of aspects of social connection (e.g., social networks, social engagement, social support and loneliness), as well as strategies to address them, may differ for those living in LTC homes compared to those living in the community. Within LTC homes, residents share space, take part in congregate activities (e.g., meals), have daily interactions with staff and are offered group recreational and social activities. For many, families provide social support, including assistance with care.[REF] Yet, those living in LTC homes report higher levels of loneliness than those living in the community;(8) most LTC home residents are older adults and many have complex health needs, including sensory or cognitive impairment,(9) which can impact social connection.(10, 11) Taken together, residents of LTC homes are a population with distinct needs living in settings that offer opportunities for novel interventions.

The current scoping review was catalyzed by the COVID-19 pandemic in order to provide LTC residents, families and staff with a summary of the research evidence linking social connection to mental health outcomes as well as strategies they might implement quickly to address social connection in this population.

RESEARCH DESIGN AND METHODS

This scoping review is a sub-study of a larger scoping review(12) that was initiated prior to the COVID-19 pandemic. We conducted a scoping review for our knowledge synthesis in order to address a broad set of research questions, with a flexible and iterative approach, on a research topic where we expect the limited number of studies will preclude a systematic review.(13) Our protocol was previously published(12) and our methods follow the six-stage approach described by Arksey and O'Malley(14) and Levac et al.(15) We are reporting our results in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews.(16)

Step 1: Identifying the research questions

Our questions were developed in the context of a research funding opportunity, from the Government of Canada (via the Canadian Institutes of Health Research), to support rapid knowledge synthesis and knowledge related mobilization of current evidence on the needs of mental health and substance use services, delivery, and related guidelines, in the COVID-19 context. These questions were directed by stakeholders (see Step 6).

(1) What mental health outcomes are associated with social connection for people living in LTC homes?

(2) What interventions/strategies might support social connection for people living in LTC homes in the context of infectious disease outbreaks like COVID-19?

Step 2: Searching for relevant studies

We selected studies identified from the larger scoping review whereby published journal articles reporting results of observational and intervention studies were eligible for the review if they reported a quantitative measure of social connection in a population of adult residents of LTC homes.

Social connection

We included research on aspects of *social integration* that have been identified specifically for research in LTC homes,(17) including:

- *social networks,* i.e., size and nature of the social network structure as well as the characteristics of the social ties, and acknowledge that it is these networks that provide opportunities for social support and social engagement(18)
- *social engagement*, i.e., taking part in real life activities with others,(18, 19) as well as the converse, *social disengagement*(20)
- *social support,* i.e., instrumental, emotional, appraisal and informational help available,(18) as well as *social isolation,* i.e., lack of personal relationships with family, friends, and acquaintances on which people can fall back in case of need(21)
- *social capital*, i.e., features of an organization that facilitate coordination and communication for mutual benefit, such as interpersonal trust, reciprocity and mutual aid(17, 22)

The subjective experience of social integration, including *loneliness*(23) and *perceived isolation*(24), were also explicitly included. However, given the diversity of terminology used in this area of research, our search strategy used a broader list of terms.(12) In this paper, we refer to all these above-listed concepts collectively as *social connection*.

LTC homes

We included studies reporting results specifically for residents of LTC homes, nursing homes or care homes (i.e., adults living in residential facilities, whose staff provide help with most or all daily activities and 24-hour care and supervision). These terms reflect differences in terminology between countries, but were chosen for their overlap with the international consensus definition of nursing home.(25)

To identify studies, we developed a comprehensive search strategy(12) with an experienced information specialist who first conducted in MEDLINE(R) ALL (in Ovid, including Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily) and then translated it into CINAHL (EBSCO), PsycINFO (Ovid), Scopus, Sociological Abstracts (Proquest), Embase and Embase Classic (Ovid), Emcare Nursing (Ovid) and AgeLine (EBSCO). All searches were conducted from the databases' inception through to the date the search was executed (July 2019), limited to English language. Reference lists were also scanned to identify additional studies. Covidence (www.covidence. org) and Endnote were used to manage the review process.

Step 3: Selecting studies

For the current sub-analysis, two reviewers independently reviewed full text papers to identify those that reported the:

(1) association between any measure of social connection and a mental health outcome (e.g., depression, responsive behaviours, cognition) among LTC residents

(2) association between a modifiable risk factor(s) and any measure of social connection among LTC residents

(3) the results of intervention study (randomized and non-randomized) conducted among LTC residents whereby the outcome was any measure of social connection.

We also checked our list against three recent systematic reviews of interventions targeting social connection among LTC home residents.(26-28) Any disagreements were resolved by discussion. No formal quality assessment of the studies was undertaken. To be more inclusive of studies of residents with dementia, we included papers that reported social interaction as a measure of social connection,

but we did not include measures of social response,(29) social behaviour,(30) social interest,(31) social communication (e.g., eye contact, facial expressions, body language, etc.)(32-34) or engagement (e.g., attention to, attitude towards and duration being occupied with a stimulus)(35-37) that was not explicitly characterized as social.

Step 4: Charting the data

Two reviewers then independently extracted data from these studies. We summarized studies according to study characteristics and a narrative synthesis and mapping of the results reported.(14, 15) Acknowledging previously reported knowledge gaps for persons with dementia,(38) we also extracted data on inclusion and exclusion criteria related to dementia or cognitive status. In order to highlight any sex- and gender-related differences, we also flagged studies that reported sex-stratified or -specific results. We reported the results in two parts, according to the two questions guiding the review.

Step 5: Collating, summarizing and reporting the results

We took an iterative approach to reporting our results, whereby the first author reported consolidated results back to the entire study team who reviewed the results, suggested refinements and provided insights on the finding, including their applicability in the context of COVID-19.

Step 6: Consulting with stakeholders

In our initial protocol,(12) we had described opportunities to present to LTC residents, families and staff in a LTC home in Toronto, Canada. The impacts of COVID-19 on LTC homes, including infection control measures restricting visitors, made these consultations impractical. Yet, community participation is critical in the current COVID-19 pandemic context; communities can help identify solutions and are well placed to devise collective responses.(39) Thus, for this review, we worked with partners at organizations who represent these stakeholder groups: Behavioural Supports Ontario (BSO), Family Councils Ontario (FCO) and the Ontario Association of Residents' Councils (OARC). These members of our study team were involved in preparation (priority-setting and defining the review questions), execution (analyzing data, interpreting and contextualizing the results) and translation (co-authors on the current review and, eventually, disseminating tailored summaries of the results). They were also involved in identifying the categories of interventions/strategies that could be implemented and at relatively low cost and adapted by LTC staff, families and residents in the current COVID outbreak and identifying practical applications of these strategies; this was informed by reviewing the results of a survey conducted by BSO to gather strategies and innovations from BSO team members that have been put in place to establish and maintain social connections within the COVID-19 context.

RESULTS

Our initial search yielded 20,293 titles, which reduced to 11,653 after deduplication.(40) After two reviewers independently screened article titles and abstracts, we were left with 1,217 papers. This list was further distilled to <<INSERT>> papers after two reviewers independently conducted full text review (see figure <<INSERT PRISMA>>).

The characteristics of the included studies are described in table 1. Over half (n=77; 60%) of the studies were published after 2010. By region, the largest proportion of studies were from North America (n=51; 40%) and, of them, almost all were from the United States (n=45). Overall, roughly one third (n=46; 36%) of studies included less than 100 LTC residents in the sample, however, smaller studies made up a larger proportion of intervention studies (n=29; 66%) compared to observational studies in question 1 (n=13; 21%) and question 2 (n=4; 17%). The most commonly investigated aspects of social connection were social engagement (n=41; 32%), social support (n=33; 26%) and loneliness (n=30; 23%).

Table 1: Description of published research articles included in scoping review

Study characteristics	**Question 1**		**Question 2**				**TOTAL**	
	(n=61)		Observational (n=23)		Intervention (n=44)		(n=128)	
	n	%	n	%	n	%	n	%
Year of publication								
Pre-1990							6	5%
1990-1999							11	9%
2000-2009							34	27%
2010-2019							77	60%
Region								
Asia							36	28%
Europe							29	23%
North America							51	40%
Other/multiple							12	9%
Study design								
Cross-sectional								
Cohort								
Quasi-experimental								
Randomized controlled trial								
Other/not stated								
Sample size (LTC home residents)								
Less than 100							46	36%
100-249							41	32%
250-499							16	13%
500 or more							24	19%
Not stated							1	1%
Aspect(s) of social connection*								
Loneliness							30	23%
Social capital							1	1%
Social engagement							41	32%
Social interaction							17	13%
Social isolation							5	4%
Social network							13	10%
Social participation							4	3%
Social relations							11	9%

Social support							33	26%
Social withdrawal							4	3%

*column percent adds to more than 100% because some studies investigated multiple aspects of social connection

What mental health outcomes are associated with social connection for people living in LTC homes?

For question 1, we identified 61 studies that tested the association between social connection and mental health outcomes (see table <<>>). The most commonly investigated aspects of social connection were social support (n=26; 43%), social engagement (n= 23; 38%), loneliness (n= 11; 18%) and social network (n=10; 16%); some studies investigated multiple measures. We categorized these studies according to the reported mental health outcomes: depression; responsive behaviours; mood, affect and emotions; anxiety; cognitive decline; and other mental health outcomes (see tables <<INSERT>>) – although we acknowledge some overlap between these categories.

Depression

We found 35 studies that reported a measure of association testing the relationship between social connection and depression among nursing home residents. Most (n=28) of the studies were cross-sectional. The most commonly used measures of depression were the Geriatric Depression Scale (GDS) (n=16), the 15-item Geriatric Depression Scale (GDS-15) (n=7) and the Center for Epidemiological Studies-Depression (CES-D) scale (n=5). Studies reported multiple aspects of better social connection to be associated with less depression,(41-69) although five studies did not find statistically significant associations(70-74) and one found social support was associated with increased depression among new nursing home residents.(75)

Responsive Behaviours

Nine studies reported a measure of association testing the relationship between social connection and responsive behaviors among nursing home residents, mostly cross-sectional (n=7), mostly from the United States (n=5) and typically reporting physical and verbal expression outcomes. Most of the studies reported social connection to be associated with less responsive behaviour,(48, 76-80) but one study found number of family visits was not associated with agitation(81) and another found high social interaction was associated with more agitation.(82) One study found that social engagement was associated with less responsive behavior only among residents without dementia.(83)

Mood, Affect and Emotions

Eight studies reported a measure of association testing the relationship between social connection and mood, affect and emotion outcomes. Most of the studies were cross-sectional (n=5) and all supported the finding that social connection was associated with better mood, affect and emotions.(43, 53, 84-88)

Anxiety

There were three cross-sectional studies that tested the association between social connection and anxiety in nursing home residents. Two studies reported that better social connection was associated with less anxiety.(41, 44) Conversely, one study of new nursing home residents found that higher informational social support was associated with more anxiety.(75)

Cognitive Decline

Two cohort studies, both using data from the Resident Assessment Instrument (RAI), tested the association between social engagement and cognitive performance; both found that more social engagement was associated with less cognitive decline.(89, 90)

Other Mental Health Outcomes

Three studies used RAI data to test the association between social engagement and (antipsychotic or hypnotic) medication use but produced mixed results.(48, 91, 92) Two cross-sectional studies reported associations between social support and lower death anxiety.(93, 94) Two cross-sectional studies reported roles for social support, loneliness and social engagement in relation to suicidal ideation.(95, 96) Two cross-sectional studies reported that better social connection was associated with less boredom.(97, 98) Studies also linked social connection to daily crying,(99) and psychiatric morbidity.(100)

What interventions/strategies support social connection for people living in LTC homes in the context of infectious disease outbreaks like COVID-19?

For question 2, after reviewing the studies that met criteria (2) or (3), our team identified twelve interventions/strategies as potentially quick and relatively low-cost to implement and adapt in the current COVID outbreak: manage pain; address vision and hearing loss; sleep at night, not during the day; find opportunities for creative expression; exercise; maintain religious and cultural practices; garden; visit with pets; use technology to communicate; laugh together; reminisce; and, communicate non-verbally. There were 23 observational studies and 44 intervention studies that reported social connection outcomes and were relevant to these twelve strategies (see table <<>>). Among observational studies, the most commonly investigated aspect of social connection was social engagement (n=12; 52%), most often using health administrative data and the RAI-MDS index of social engagement. Among intervention studies, the most commonly investigated aspect of social connection was loneliness (n= 16; 36% studies), most often using the UCLA Loneliness Scale.

1) Manage Pain

Eight observational studies tested the association between pain and social relationships or loneliness.(101-108) Two studies found that pain was associated with lower social connection, as assessed with reduced social relationships scores(103) as well as more loneliness.(106) One study carried out in chronic stroke patients in Dutch nursing homes, suggested influence of pain on social engagement may depend on the level of cognitive impairment.(101) Five studies found no association between pain and social connection.(101, 102, 104, 105, 107) However, three of these studies reported the association between pain and social relationships or loneliness disappeared after adjusting for other variables;(101, 102, 104) such findings leave open the possibility that the impact of pain on social connection is explained by these other factors, such as neuropsychiatric symptoms. Another study showed that, among residents with persistent pain, analgesic use was associated with improvements in social engagement.(108) Of the five intervention studies addressing pain, four showed beneficial impact on social interaction and involvement,(109) social relations,(110) and loneliness(111, 112) whereas one showed no impact on loneliness.(113) In four of these intervention studies,(110-113) pain management was part of a multicomponent intervention (e.g., delivered with programs, such as gardening or art).

2) Address Vision and Hearing Loss

Seven observational studies, all using health administrative data from the Resident Assessment Instrument-Minimum Data Set (RAI-MDS), consistently showed an association between visual impairment and lower levels of social engagement.(114-121) For residents with cataracts, cataract surgery was associated with improvements in social interaction.(122) One randomized controlled trial, assessing the effect of treating uncorrected refractive error (getting glasses) showed an effect by improving social interaction.(123) Although fewer studies have linked hearing impairment to social engagement,(119, 121) and some find no association,(114, 116, 118) taken in context with the apparent

influence of dual sensory loss,(117) it also suggests strategies to address hearing impairment might be a useful strategy.

3) Sleep at Night, Not During the Day

One observational study found that LTC residents with more sleep disturbances had lower levels of social engagement(124) whereas another found no association between sleep difficulties and social relationships.(103) One intervention study tested the impact of a sleep intervention and reported intervention group increased participation in social activities.(125)

4) Find Opportunities for Creative Expression

Four intervention studies tested the impact of creative expression programs on social connection; two reported results that suggested potential improvements in social engagement,(126) and social interaction(127) but there mixed results for social relations and social isolation.(128, 129)

5) Exercise

Two small observational studies found the associations between physical activity or participation in physiotherapy and social connection were not statistically significant.(130, 131) Three intervention studies tested the impact of exercise programs; one study reported no change in social relations,(132) another reported improvements in social participation(133) and the third, carried out among residents with chronic pain, found decreased loneliness.(134)

6) Maintain Religious and Cultural Practices

Three observational studies tested associations between social connection and religious activities, spirituality and faith. One reported that, for both African American and white nursing home residents, preference for religious activities and drawing strength from faith were associated with higher social engagement.(116) Another showed religious coping was positively associated with social support.(135) One reported the association between spirituality and social engagement was not statistically significant.(115)

7) Garden

Five studies tested the effect of horticulture and indoor gardening programs for LTC residents.(136-139) <<INSERT: Chen>> Three studies that compared the program to usual care found the gardening programs were associated with improvements in social relationship and loneliness outcomes.(137, 138) <<INSERT: Chen>> However, the two studies that compared the programs with other interventions did not find an effect.(136, 138) None of these studies included residents with dementia.

8) Visit with Pets

There were twelve studies that assessed the impact of pet interactions and animal assisted therapy on social connection. These studies suggested beneficial impacts on social connection, including reducing loneliness,(140-143) and social interaction(142, 144-149) but results were not statistically significant in one study(150) and another suggested the any visits (i.e., with or without pets) increased social interaction.(151)

9) Use Technology to Communicate

Four studies assessed the impact of communication technology, but two were small-scale feasibility/pilot studies.(152, 153) The two quasi-experimental studies that tested the effect of regular videoconferencing showed beneficial effects for both social support and loneliness.(154, 155) However, these studies excluded persons with moderate or severe cognitive impairment.

10) Laugh Together

Three intervention studies reported the impact of humour therapy; one study reported decreased emotional and social loneliness,(156) whereas the other two interventions were not found to reduce loneliness(157) or social disengagement.(158)

11) Reminisce

Seven interventions studies tested reminiscence therapy or programs. These studies showed increases in social participation,(159, 160) social engagement,(161, 162) social interaction,(163) social network,(162) and decreases in loneliness(164) but not social relationships(159, 160) or social support.(162) One study found no effect of the intervention on social engagement.(165)

12) Communicate Non-verbally

Five observational studies showed that impaired communication was associated with reduced social engagement or increased social withdrawal. Three studies used RAI-MDS data to examine this relationship among LTC residents overall(115, 119, 121) whereas two studies used detailed aphasia assessments to study individuals with dementia.(166, 167)

DISCUSSION AND IMPLICATIONS

Summary of evidence

Research conducted among people living in LTC homes has reported associations between measures of social connection and mental health; less social connection is associated with negative mental including depression, responsive behaviours, cognitive decline and other outcomes. Still, the evidence is this area has limitations. *First*, most studies are cross-sectional; they measure social connection and mental health at the same time so it is impossible establish temporality. For example, studies considered depression as a predictor of social connection whereas others may have considered it an outcome(118, 168-173) – in reality, bidirectional relationships are likely<<REFERENCE>>. *Second*, many studies did not include strategies to account for potential confounding and presented only unadjusted analyses. *Third*, many of the studies were carried out in residents either with or without dementia (but not both); it is not always clear if results from one group will also apply to the other.[REF] *Finally,* despite potential biological and gender differences, very few studies reported results stratified by sex.

<<TO BE WRITTEN>>

Previous reviews of interventions to improve social connection among LTC residents have reported <<INSERT>>. Our review builds on this work by also considering observational research and contextualizing the findings through consultation with organisations representing LTC residents, family and staff. Through these consultations, were identified strategies that are may help to enable social connectionfor LTC residents. <<INSERT>>

Strategies that enable social engagement for residents may also positively impact staff job satisfaction and burnout through the influence on staff/resident interaction and resident engagement and affect.<<REF: Fritsch>>

Limitations

Our scoping review used a comprehensive search strategy to identify published literature that quantified any aspect(s) of social connection among residents of LTC homes. To our knowledge, it is the first to consider both observational and intervention studies and to include multiple aspects of social connection. Still, we acknowledge certain limitations. In particular, we did not review studies that were intended to address social connection as a means of addressing some other outcome (e.g., responsive behaviours)(174-177) unless these studies also explicitly assessed some quantitative measure of social connection as an outcome. Although we had intended to include such studies,(12) in practice, categorizing interventions as addressing social connection was difficult to operationalise. We acknowledge that a better characterization of these studies would have been particularly useful to delineate the associations between social connection and mental health.

<<TO BE WRITTEN>>

Did not explore associations among social connection variables (e.g., social network, support or engagement and loneliness).(43, 46, 173, 178-182)

Conclusions

<<TO BE WRITTEN>>

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QUESTION 1: Appendix

Depression

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Ahmed, 2014*	Egypt	Geriatric home residents (n=240)	Exclusion: cognitive impairment (MMSE score < 25)	Cross-sectional	**Loneliness,** using a three-item loneliness scale	**Depression,** using the shorter version of the Geriatric Depression Scale (GDS-15)	Loneliness often (OR 5.02; 95%CI 1.96-12.90; p=0.001) or sometimes (OR 3.79; 95%CI 1.35-10.66; p=0.011) associated with depression.
Chau, 2019	Australia	Long term care residents (n=81)	Exclusion: moderate to severe cognitive impairment (MMSE score < 18)	Cohort	**Social support,** using the Multidimensional Scale of Perceived Social Support (MSPSS)	**Depressive symptoms,** using Geriatric Depression Scale short form (GDS-15)	Worse perceived social support was statistically significantly associated with increased depression over time (p< 0.001).
Cheng, 2010	Hong Kong	Nursing home residents (n=71)	Exclusion: moderate to severe cognitive impairment (MMSE score < 18)	Cross-sectional	**Social network,** using the network mapping procedure **Social support (received and provided)** **Social engagement (visits),** using contact frequency	**Depression,** using the Geriatric Depression Scale (GDS)	Number of contacts with and social support from staff and fellow residents and support provided to all network members were all inversely associated with depression (p<0.05).
deGuzman, 2015	The Philippines	Nursing home residents (n=151)	None specified	Cross-sectional	**Social support,** using the Social Support Scale and support from family and health care providers or from other personnel	**Depression,** using the Geriatric Depression Scale (GDS)	Social support, from either family or staff, was not associated with depression.
Drageset, 2013*	Norway	Nursing home residents (n=227)	Inclusion: 'cognitively intact' (0.5 or less on the Clinical Dementia Rating Scale (CDR))	Cross-sectional	**Social support,** using the revised Social Provision Scale (SPS): attachment, social integration, opportunity of nurturance and reassurance of worth	**Depression,** using the Hospital Anxiety and Depression Scale (HADS)	The social support subdimensions of social integration (OR: 0.96; 95%CI: 0.93,-0.99; p=0.02) and reassurance of worth (OR: 0.95; 95%CI; 0.91-0.99; p=0.006) were associated with less depression.
Farber, 1991	United States	Nursing home residents (n=70)	Exclusion: moderate-to-severe dementia	Cross-sectional	**Social support,** using the Quality of Relationship Scale	**Depression**, using Center for Epidemiological	Quality of relationships (p=0.001) but not frequency of interaction (p=0.23) were inversely associated with depression.

					Social engagement (visits and phone calls), using family reported information on frequency of visits and phone calls	Studies-Depression (CES-D) scale	
Fessman, 2000	United States	Nursing facility residents (n=170)	Inclusion: sufficient cognitive ability	Cross-sectional	**Social network,** using assessment of close friends **Social engagement (visits),** using who, and how often, outsiders visited them (number of visitors/month) **Loneliness,** using the UCLA Loneliness Scale	**Depression**, using the Zung depression scale	The number of visits per month from friends and relatives was unrelated to depression; however, the number of close friends was inversely associated with depression (p<0.01). Loneliness was positively associated with depression, but statistically significant only for those with Alzheimer's disease
Gan, 2015	China	Nursing home residents (n=71)	None specified	Cohort	**Loneliness,** using the UCLA Loneliness Scale	**Depression,** using the Center for Epidemiologic Studies Depression (CES-D) scale	Loneliness was associated with depression (p< 0.05). Mediation analysis indicated that rumination did not mediate the relationship between loneliness and depression.
Hjaltadóttir, 2012*	Iceland	Nursing home residents (n=3694)	None specified	Cohort	**Social engagement**, using the RAI Index of Social Engagement (ISE)	**Depression**, using RAI Depression Rating Scale (DRS)	Compared to residents with higher social engagement, moderate (OR: 5.14; 95% CI: 4.26–6.19); p<0.001) and low (OR: 2.19; 95% CI: 1.80–2.67; p<0.001) social engagement associated with depression symptoms.
Hollinger-Smith, 2000	United States	Nursing home residents (n=130)	None specified	Cohort	**Social support,** using the Older Americans Resources and Services (OARS) social resources indicators **Social support (affective),** using the Perception of Touch Scale	**Depression,** using the Geriatric Depression Scale (GDS) **Diagnosed depression,** using clinical diagnosis on record	Using GDS, social resources and affective social support were inversely associated with depression (p<0.001). Using diagnosed depression, only affective social support was associated with depression (p<0.001).
Ya-Chuan Hsu, 2014	Taiwan	Long term care (intermediate care facility and nursing	Inclusion: cognitively intact as assessed by the Short Portable Mental Status.	Cross-sectional	**Social engagement**, using the Socially Supportive Activity Inventory (SSAI) evaluating nine different types of social activities and	**Depression**, using the Chinese Geriatric Depression Scale (GDS-15)	In eight of nine social activities, the more meaningful and enjoyable the resident rated the activity, the more significant the correlation for fewer depressive symptoms (p < 0.05). Of

		home) residents (n=174)	Exclusion: diagnosis of dementia		frequency, meaningfulness and enjoyment		all the activities, only the "pleasure trips" showed no association with depressive symptoms.
Jongenelis, 2004	The Netherlands	Nursing home residents (n=350)	Exclusion: Exclusion: moderate to severe cognitive impairment (MMSE score < 15)	Cross-sectional	**Loneliness,** using the de Jong Loneliness Scale **Social support**, using the shortened version of the Social Support List--Interaction (SSL12-I) scale	**Depression,** using the Geriatric Depression Scale (GDS) and the Schedule of Clinical Assessment in Neuropsychiatry (SCAN)	Loneliness was found to be associated with sub-clinical (OR: 3.38; 85%CI: 1.72–6.63), minor depression (OR: 4.52; 95%CI: 2.06–9.90), and major depression (OR: 22.32; 95%CI: 2.55–195.66). Lack of social support (OR: 3.32; 95%CI: 1.01–10.94) was associated with major depression.
Keister, 2006*	United States	New nursing home residents (n=114)	None specified	Cross-sectional	**Social support,** using the Modified Inventory of Socially Supportive Behaviors assessing four dimensions of social support (informational, tangible, emotional, and integration support)	**Depression,** using the Geriatric Depression Scale (GDS)	One dimension of social support was positively associated with depressive symptoms; as tangible support increased, depressive symptoms increased ($p<0.05$).
Kim, 2009	Korea and Japan	Nursing home residents (n=184)	None specified	Cross-sectional	**Loneliness,** using the Revised UCLA Loneliness Scale	**Depression,** using the shorter version of the Geriatric Depression Scale (GDS-15)	Loneliness was significant predictor of depression for the Korean ($p<0.01$) and Japanese residents ($p<0.01$).
Kroemeke, 2016*	Poland	Nursing home residents (n=180)	Exclusion: diagnosis of dementia or mild cognitive impairments	Cross-sectional (at baseline) and longitudinal (after 1 month)	**Social support (received and provided),** using the Berlin Social Support Scales (BSSS)	**Depression**, using Center for Epidemiological Studies-Depression (CES-D) scale	In cross-sectional analysis, there was an inverse relationship between receiving support and depression. In longitudinal analysis, neither received support nor given support were associated with depressive symptoms.
Krohn, 2000	United States	Nursing home residents (n=29)	Inclusion: "cognitively intact"	Cross-sectional	**Loneliness,** using the UCLA Loneliness Scale	**Depression**, using the Geriatric Depression Scale (GDS)	There was a positive association between loneliness and depression ($p=0.020$).
Kwok, 2011	China	Nursing home	Exclusion: moderate to severe	Cross-sectional	**Social support (perceived institutional peer support**	**Depression,** using the Geriatric	No association between perceived family support and depressive

		residents (n=187)	cognitive impairment (MMSE score < 18)		**and perceived family support),** using modified version of the Lubben Social Network Scale	Depression Scale (GDS)	symptoms. Higher level of perceived institutional peer support was significantly correlated with a lower level of depressive symptoms (p<0.001).
Leedahl, 2015	Unites States	Nursing home residents (n=140)	Exclusion: moderate to severe cognitive impairment (MDS 3.0 Brief Interview for Mental Status < 13 or MDS 2.0 Cognitive Scale score > 2).	Cross-sectional	**Social network,** using the concentric circle (i.e., egocentric network) approach **Social capital,** using the indicators norms of reciprocity and trust **Social support,** using a modified version of the Inventory of Socially Supportive Behaviors **Social engagement,** using Likert scale questions about participation in various social activities within and outside the nursing home and a question about group/organization participation	**Depression**, using the Geriatric Depression Scale (GDS)	Social networks had a positive indirect relationship with mental health, primarily via social engagement. Social capital had a positive direct relationship on mental health.
Lin, 2007	Taiwan	Nursing home residents (n=138)	Inclusion: "cognitively intact" Exclusion: score of 4 or less on the Short Portable Mental Status Questionnaire (SMPSQ)	Cross-sectional	**Social support,** using the Social Support Scale to measure perceived social support from nurses, nurse aides, family and roommates.	**Depression**, using Center for Epidemiological Studies-Depression (CES-D) scale	Lack of social support from nurses (p=0.034), family (p<0.001) and roommates (p=0.012) were correlated with depressive symptoms. In adjusted analysis, social support from family was inversely associated with depression (p<0.001).
Lou, 2013	Hong Kong	Long term care residents (n=1184)	None specified	Cohort	**Social engagement,** using the RAI Index of Social Engagement (ISE)	**Depression**, using the RAI Depression Rating Scale (DRS)	At baseline, social engagement was inversely associated with depressive symptoms. Increases in social engagement had a significant inverse association with changes in

							depressive symptom scores over time.
McCurren, 1999	United States	Nursing home residents (n=85)	Exclusion: diagnosis and symptom progression consistent with advanced irreversible dementia	Cross-sectional	**Social network,** using the Salamon-Conte Life Satisfaction in the Elderly Scale (LSES) social contacts subscale	**Depression,** using the Geriatric Depression Scale (GDS)	Social contact was inversely correlated with depression (p=0.0001).
Nikmat, 2015	Malaysia	Nursing home residents (n=149)	Inclusion: cognitive impairment (Short Mini Mental State Examination (SMMSE) < 11)	Cross-sectional	**Loneliness/social isolation,** using The Friendship Scale (FS)	**Depression,** using the Geriatric Depression Scale (GDS)	Loneliness/social isolation was associated with depression (p<0.001).
Patra, 2017	Greece	Nursing home residents (n=170)	None specified	Cross-sectional	**Social support,** using the Multidimensional Scale of Perceived Social Support (MSPSS) **Social engagement (visits),** using frequency of visits by relatives	**Depression,** using the shorter version of the Geriatric Depression Scale (GDS-15)	Social support was inversely associated with depression (p<0.001). Frequency of visits by relatives was associated with depression (p<0.001).
Potter, 2018	United Kingdom	Care home residents (n=510)	None specified	Cohort	**Social engagement**, using the RAI Index of Social Engagement	**Depression**, using the shorter version of the Geriatric Depression Scale (GDS-15)	Controlling for home level covariates, social engagement was not associated with depression.
Pramesona, 2018	Indonesia	Nursing home residents (n=181)	Exclusion: diagnosed with severe cognitive impairment or dementia	Cross-sectional	**Social support,** using a classification: from spouse, family, staff or others or no one; and type of support, using a classification: psychological or financial or no support	**Depression**, using the Geriatric Depression Scale (GDS)	In univariate analysis, lack of social support was associated with depression (OR: 2.11, 95%CI: 1.15-3.87; p=0.15) but not in adjusted analysis (OR: 2.11; 95%CI: 0.48-9.32; P=0.325). Type of support was not associated with depression.
Segal, 2005	United States	Nursing home residents (n=50)	Exclusion: cognitive impairment	Cross-sectional	**Social support,** using Social Support List of Interactions (SSL12-I)	**Depression**, using the Geriatric Depression Scale (GDS)	Correlation between social support and depression was not statistically significant.

Somporn, 2012	Thailand	Nursing home residents (n=237)	None specified	Cross-sectional	**Loneliness,** using the UCLA Loneliness Scale **Social engagement,** using scheduled social activities	**Depression**, using the Thai Geriatric Depression Scale (TGDS-30)	Loneliness (p< 0.001), and lack of social activity (p< 0.001) were associated with depressive symptoms
TankBuschmann, 1994	United States	Nursing home residents (n=50)	None specified	Cross-sectional	**Social support (affective),** using the Perception of Touch Scale	**Depression**, using the Geriatric Depression Scale (GDS)	Affective social support was associated with reduced depression (p<0.001).
Tiong, 2013	Singapore	Nursing home residents (n=375)	Exclusion: uncommunicative or unable to respond meaningfully (e.g. dementia)	Cross-sectional	**Social engagement (visits),** using questions about frequency of visitors	**Depression**, using Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) criteria	Lack of social contact was associated depression (OR: 2.33, 95%CI: 1.25–4.33).
Tosangwarn, 2018	Thailand	Care home residents (n=128)	Exclusion: severe cognitive impairment	Cross-sectional	**Social support,** using the Thai Version of Multidimensional Scale of the Perceived Social Support (MSPSS)	**Depression**, using the Thai Geriatric Depression Scale (TGDS-30)	Perceived social support was inversely associated with depression (OR: 0.969; 95%CI: 0.939-0.999; p=0.044).
Tsai, 2005	Taiwan and Hong Kong	Nursing home residents (n=364)	Exclusion: moderate to severe cognitive impairment (MMSE < 16 for participants with no formal education; MMSE < 20 for primary school graduates or above)	Cross-sectional	**Social support,** using the Social Support Scale (including social support network, quantities of social support, and satisfaction with social support subscales)	**Depression**, using the Chinese Geriatric Depression Scale - Short Form	Satisfaction with social support and social support network were significantly and negatively related to depressive symptoms (p<0.01).
Tu, 2012	Taiwan	Long term care residents (n=307)	None specified	Cross-sectional	**Social support,** using the Social Support Scale (assessing emotional, instrumental, and informational support, and positive social interaction)	**Depression**, using Center for Epidemiological Studies-Depression (CES-D) scale	Among social support subscales (emotional support; Social companionship; Informational support; Instrumental support), only social companionship associated with depression in adjusted analysis (p<0.05). All were associated with depression in unadjusted analysis.

Vanbeek, 2011	The Netherlands	Long-term care dementia unit (nursing and residential home) residents (n=502)	None specified	Cross-sectional	**Social engagement,** using the Index of Social Engagement (ISE)	**Depression**, using the MDS Depression Rating Scale (DRS)	Association between social engagement and depression was not statistically significant.
Yeung, 2011	Hong Kong	Nursing home residents (n=187)	None specified	Cross-sectional	**Social support,** using a questionnaire about family support; residential social support; and residential social participation	**Depression**, using the Geriatric Depression Scale (GDS)	Only residential social support associated with depression (OR:0.36; 95%CI: 0.24-0.53).
Zhao, 2018	China	Nursing home residents (n=323)	Exclusion: severe cognitive impairment (MMSE score < 10)	Cross-sectional	**Loneliness,** using a Chinese version of the UCLA Loneliness Scale **Social support,** using the Multidimensional Scale of Perceived Social Support (MSPSS)	**Depression**, using the Hospital Depression Scale (HDS)	The association between loneliness and depressive symptoms was partially mediated by resilience. The indirect effect of the mediation model was moderated by social support.

Responsive Behaviours

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Chen, 2000	United States	Nursing home residents (n=129)	Exclusion: no cognitive impairment (MMSE score > 24)	Cross-sectional	**Social interaction**, using the Social Interaction Scale (SIS) subscales: Institutional Interaction and Family/Community Interaction	**Aggressive behaviour,** using the Ryden aggression scale 2 (RAS2) with three subscales: Physically aggressive behavior); verbally aggressive behaviour; sexually aggressive behavior.	Social interaction inversely associated with physical aggression (p<0.05) but not verbal or sexual aggression.
Choi, 2018	Korea	Nursing home residents (n=1447)	None specified (but results stratified by dementia)	Cross-sectional	**Social engagement,** using the RAI Index of Social Engagement (ISE)	**Aggressive behaviours,** using RAI data on physical abuse, verbal abuse, socially inappropriate or destructive behaviours and/or resistance to care in the last three days	Social engagement associated with less aggressive behaviour among those without dementia (OR: 0.31; 95% CI: 0.15–0.62; p<0.001) but not among those with dementia (OR: 0.74; 95%CI: 0.51–1.08).
Cohen-Mansfield, 1990	United States	Nursing home residents (n=408)	None specified	Cross-sectional	**Social network (quality and size/density),** using the Hebrew Home Social Network Rating Scale (HHSNRS)	**Screaming,** using the Cohen-Mansfield Agitation Inventory (CMAI)	Poor quality of the social network was associated with screaming (p<0.01)
Cohen-Mansfield, 1992	United States	Nursing home residents (n=408)	None specified	Cross-sectional	**Social network,** using a questionnaire developed by research team – frequency of contact with: staff, visitors and others; intimacy with: staff, visitors; frequency of visitors	**Agitation,** using the Cohen-Mansfield Agitation Inventory (CMAI): aggressive behaviour, physically nonaggressive behaviour and verbally agitated behaviour	Intimacy of social network inversely associated with total number of agitated behaviours (p<0.01), aggressive behaviour (p<0.01) and verbally agitated behaviour (p<0.01). The size/density of the social network did not differentiate agitated individuals from other residents.
Draper, 2000	Australia	Nursing home residents (n=25	None specified	Case-control	**Social engagement,** using the Social Activity	**Vocally disruptive behaviour**	Participation in group activities (p=0.005), hobbies (p=0.004) and

		cases and n=25 controls)			Inventory (SAI) items on group activities, hobbies, independent ADL, physical activities, culture-specific programs, visitors, and the involvement of family and friends in the nursing home		culture-specific programs (p=0.005) less common among cases.
Hjaltadóttir, 2012*	Iceland	Nursing home residents (n=3694)	None specified	?	**Social engagement**, using the RAI Index of Social Engagement (ISE)	**Behavioural symptoms**, using RAI	Compared to residents with higher social engagement, moderate social engagement associated with behavioural symptoms (OR: 1.38; 95% CI: 1.15–1.66; p<0.001) but not those with lowest social engagement (OR: 0.89; 95% CI: 0.73–1.09)
Kolanowski, 2006	United States	Nursing home residents (n=30)	Inclusion: dementia diagnosis that met DSM-IV criteria, and MMSE score <24	Cross-sectional	**Social interaction,** using the Passivity in Dementia Scale (PDS) **Social withdrawal,** using the withdrawal subscale of the Multidimensional Observation Scale for Elderly Subjects (MOSES)	**Agitation,** using the Cohen-Mansfield Agitation Inventory (CMAI)	Agitation was significantly greater under high social interaction as compared with low social interaction (p<0.0001) regardless of the extraversion score.
Livingston, 2017	England	Care home residents(n=1489)	Inclusion: diagnosis of dementia or screened positive for dementia	Cross-sectional	**Social engagement (visits),** using the number of family visits	**Agitation,** using the Cohen-Mansfield Agitation Inventory (CMAI) **Neuropsychiatric symptoms (agitation),** using the Neuropsychiatric Inventory (NPI)	Number of family visits were not associated with CMAI agitation caseness (OR: 0.984; 95% CI: 0.914-1.059) or NPI agitation caseness (OR: 0.990; 95%CI: 0.976, 1.005).
Marx, 1990	United States	Nursing home residents (n=408)	None specified	Cross-sectional	**Social network (quality and size/density),** using the Hebrew Home Social	**Aggression (physical, verbal, sexual and self-abuse),** using the Cohen-Mansfield Agitation Inventory (CMAI)	Poor quality of social network associated with aggression, including

					Network rating Scale (HHSNRS)		physical, verbal and self-abuse ($p<0.05$).

Mood, affect and emotion

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Beerens, 2018	The Netherlands	Long-term care residents with dementia (n=115)	Inclusion: a formal diagnosis of dementia	Cross-sectional	**Social interaction,** using the Maastricht Electronic Daily Life Observation-tool (MEDLO-tool)	**Mood,** using the Maastricht Electronic Daily Life Observation-tool (MEDLO-tool)	Social interaction was associated with higher (positive) mood (p<0.001)
Cheng, 2010*	Hong Kong	Nursing home residents (n=71)	Exclusion: moderate to severe cognitive impairment (MMSE score < 18)	Cross-sectional	**Social network,** using the network mapping procedure **Social support (received and provided)** **Social engagement (visits),** using contact frequency	**Positive Affect,** using the Chinese Affect Scale	Network size, contact with family, support from family, support from staff and fellow residents and support provided to all network members were all associated with positive affect (p<0.05).
Cohen-Mansfield, 1993	United States	Nursing home residents (n=408)	None specified	Cross-sectional	**Social network,** using the Hebrew Home Social Network Rating Scale	**Depressed affect,** using the Depression Rating Scale.	Poor quality of social networks associated with depressed affect.
Gilbart, 2000	Canada	Continuing care and long-term care residents (n=385)	None specified	?	**Social support,** using questions about type and level of support provided by a number of possible significant others **Social engagement**, using the RAI Index of Social Engagement (ISE)	**Affect,** using the Short Happiness and Affect Research Protocol (SHARP) **Positive and negative affectivity,** using the Measure of the Intensity and Duration of Affective States (MIDAS) **Mood state,** using RAI Mood State Resident Assessment Protocols	Social engagement positively associated with SHARP (p=0.0001) and MIDAS scores (p=0.0001) but inversely associated with mood state problems (p=0.0002)
Jao, 2018	United States	Nursing home residents (n=126)	Inclusion: diagnosis of dementia following Diagnostic and Statistical Manual of Mental Disorder (DSM-IV)	Repeated measures	**Social interaction,** using the Passivity in Dementia Scale (PDS)	**Affect,** using the Philadelphia Geriatric Center Apparent Affect Rating Scale. Two positive affect states (interest and pleasure) and three	Social interaction was significantly related to higher interest and pleasure at within- and between-person levels (p<0.001). Social

			and MMSE scores between 7 and 24			negative affect states (anxiety, anger, and sadness) were included.	interaction significantly predicted anxiety (p<0.001) and sadness (p=0.01) at the between-person level only. Social interaction was not associated with anger.
Kroemeke, 2016*	Poland	Nursing home residents (n=180)	Inclusion: no cognitive disorder (no diagnosis of dementia or mild cognitive impairments)	Cross-sectional (at baseline) and longitudinal (after 1 month)	**Social support (received and provided),** using the Berlin Social Support Scales (BSSS)	**Positive affect,** using three items (joy, satisfaction, optimism) from the Positive and Negative Affect Schedule (PANAS)	In cross-sectional analysis, there was a significant positive relationship between providing and receiving support and positive affect. In longitudinal analysis, neither received support nor given support were associated with positive affect.
Lee, 2017	United States	Nursing home and assisted living residents (n=110)	Inclusion: diagnosis of dementia following Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) and MMSE score < 24	Cross-sectional	**Social interaction,** using observations of interaction between nursing staff and nursing home residents (verbal or nonverbal; positive, negative or neutral)	**Positive and negative emotional expressions,** using observations	Verbal (p<0.01) and verbal + nonverbal (p<0.01) interactions were associated with positive emotional expressions. Verbal + nonverbal (p=0.01) interactions were associated with negative emotional expressions. Positive (p<0.01) and neutral interactions (p<0.01) were associated with positive emotional expression. Neutral (p=0.00) and negative interactions (p=0.02) were associated with negative emotional expression.
Sherer, 2001	Israel	Nursing home residents (n=43)	Exclusion: Alzheimer's disease	Cross-sectional	**Social network,** using 25 open-ended questions about number of friends, whether they visit them,	**Morale,** using the Philadelphia Geriatric Center Morale Sub-Scales for agitation (anxiety and	Number of friends had a positive effect on attitudes towards aging (p<0.05).

					when, frequency of visits, duration, content of visits, what was good or bad about them, satisfaction from visits, and frequency of other communications	dysphoric mood), attitudes towards own aging and lonely dissatisfaction.	Meeting friends had an effect on the three morale variables (p<0.05). Duration of visits was not related to morale levels.

Anxiety

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Ahmed, 2014*	Egypt	Geriatric home residents (n=240)	Exclusion: cognitive impairment (MMSE score < 25)	Cross-sectional	**Loneliness,** using a three-item loneliness scale	**Anxiety,** using the Arabic version of the Hamilton Anxiety Scale	Loneliness often (OR: 4.46 95%CI: 1.36-14.68; p=0.014) was associated with anxiety but not loneliness sometimes OR: 2.47; 95%CI: 0.64-9.54; p=0.189).
Drageset, 2013*	Norway	Nursing home residents (n=227)	Inclusion: 'cognitively intact' (0.5 or less on the Clinical Dementia Rating Scale (CDR))	Cross-sectional	**Social support,** using the revised Social Provision Scale (SPS): attachment, social integration, opportunity of nurturance and reassurance of worth	**Anxiety,** using the Hospital Anxiety and Depression Scale (HADS)	The social support subdimension of attachment was associated with anxiety (OR: 0.97; 95%CI: 0.94, 0.99; p=0.019).
Keister, 2006*	United States	New nursing home residents (n=114)	None specified	Cross-sectional	**Social support,** using the Modified Inventory of Socially Supportive Behaviors assessing four dimensions of social support (informational, tangible, emotional, and integration support).	**Anxiety,** using the State-Trait Anxiety Inventory	One aspect of social support was positively associated with anxiety; as informational support increased, anxiety increased (p<0.05).

Cognitive Decline

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Freeman, 2017	Canada	Nursing home residents (n=111,052)	Included, results stratified by diagnosis of dementia	Cohort	**Social engagement**, using the RAI Index of Social Engagement (ISE)	**Cognitive performance,** using the RAI Cognitive Performance Scale (CPS)	Social engagement was protective against cognitive decline (p<0.0001), and more pronounced for residents without a diagnosis of dementia.
Yukari 2016	Czech Republic, England, Finland, France, Germany, Israel, Italy, and the Netherlands	Nursing home residents (n=1989)	None specified	Cohort	**Social engagement,** using seven items, similar to the RAI Index of Social Engagement (ISE)	**Cognitive performance,** using the RAI-MDS Cognitive Performance Scale (CPS)	Lower level of social engagement was associated with a greater cognitive decline. The greatest cognitive decline observed among socially disengaged residents with dual sensory impairment [1.87 (1.24:2.51)].

Other Mental Health Outcomes

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	SOCIAL exposure	MENTAL HEALTH outcomes	Study finding
Medication use							
Foebel, 2015	Canada	Long-term care residents (n=47,768)	None specified	Retrospective cohort	**Social engagement,** using RAI	**New antipsychotic medication use,** using RAI measure of drugs in the 7 days prior to assessment	Reduced social engagement associated with lower risk of new antipsychotic use (OR 0.78; 95 % CI 0.71–0.87; p < 0.0001)
Hjaltadóttir, 2012*	Iceland	Nursing home residents (n=3694)	None specified	?	**Social engagement**, using the RAI Index of Social Engagement (ISE)	**Hypnotic drug use**, using RAI data on drug use for more than 2 days in past week	Compared to residents with higher social engagement, moderate (OR: 1.06; 95%CI: 0.93–1.22) and low (OR: 0.92; 95%CI: 0.80–1.06) social engagement not associated with hypnotic drug use.
Saleh, 2017	Canada	Newly admitted residents (n = 2,639)	Inclusion: diagnosis of Alzheimer's disease or other dementias	Cross-sectional	**Social engagement**, using the RAI Index of Social Engagement (ISE)	**Antipsychotic medication use,** using RAI measure of drugs in the 7 days prior to assessment	Social engagement was associated with antipsychotic use when

							controlling for sociodemographic variables (OR: 0.86; 95% CI: 0.82-0.90; p <.0001) but association disappeared when controlling for health variables (OR: 0.97; 95% CI: 0.97-1.00; p=0.21)
Death anxiety							
Azaiza, 2010	Israel	Nursing home residents (n=65)	None specified	Cross-sectional	**Social support,** using the Social Support Scale	**Death and dying anxiety,** using two scales based on Carmel & Mutran (1997)	Higher social support was associated with lower death anxiety (p<0.05)
Mullins, 1982	United States	Nursing home residents (n=228)	None specified	Cross-sectional	**Social support,** using subjective assessment of the extent of the social support the resident received from others	**Death anxiety,** using the Death Anxiety Scale	Among younger residents (age < 75 years), lack of social support associated with higher death anxiety.
Boredom							
Ejaz, 1997	United States	Nursing home residents (n=175)	Inclusion: cognitively alert	Cross-sectional	**Social engagement (inside the nursing home),** using RAI-MDS variable for group activities that involve social interaction and time spent alone **Social network (inside the nursing home),** using the total number of people (residents and staff) to whom the resident felt close and friendship with other residents **Social interaction (inside the nursing home),** using positive interactions and negative interactions **Social engagement (outside the nursing home),** using variables for	**Boredom,** using interview item that asked subjects to rate how often they were bored in the nursing home	Negative social relationships associated with boredom (p < .01)

					each of: the number of visits from family and friends in past month		
Slama, 2000	United States	Veterans Home residents (n=35)	Inclusion: cognitively intact per Section B (Cognitive Patterns) of the Minimum Data Set (MDS)	Cross-sectional	**Loneliness,** using the UCLA Loneliness Scale	**Boredom,** using question from Geriatric Depression Scale (GDS)	Significant correlation between loneliness and boredom (p =0.009)
Suicidal thoughts							
Zhang, 2018	China	Nursing home residents (n=205)	Exclusion: a diagnosis of "dementia" or moderate to severe cognitive deficit (MMSE score < 16 for participants with no formal education and a MMSE score < 20 for primary school graduates or above)	Cross-sectional	**Social support,** using the Multidimensional Scale of Perceived Social Support (MSPSS)	**Suicidal thoughts,** using item 9 of the Beck Depression Inventory (BDI)	In univariate analysis, those with suicide thoughts reported lower social support from family (p<0.001), friends (p<0.001) and significant others (p<0.001). Perceived social support from family, friends, and significant others moderated the relationship between physical health and suicidal thoughts.
Zhang, 2017	China	Nursing home residents (n=205)	Exclusion: a diagnosis of "dementia" or moderate to severe cognitive impairment (MMSE score < 16 for participants with no formal education and a MMSE score < 20 for primary school graduates or above)	Cross-sectional	**Loneliness,** using the UCLA Loneliness Scale **Social engagement,** using the frequency of visits with their children, and the numbers of different types of social activities in which they engaged	**Suicidal ideation,** using item 9 of the Beck Depression Inventory (BDI)	In univariate analysis, those who had higher loneliness, fewer visits from their children and participated in fewer social activities (p < 0.05) all had higher suicidal ideation scores. In path analysis, loneliness can impact suicidal ideation (mediated by depression and hopelessness). Frequency of visits and engagement in social activities can also affect suicidal ideation (mediated by loneliness or self-esteem, respectively).
Psychiatric morbidity							

Andrew, 2005	England	Care home residents (n=2,493)	None specified (but use of proxy respondents based on the results of a cognitive function screen)	Cross-sectional	**Social engagement,** using group participation **Social support,** using the Social Support Index (SSI)	**Psychiatric morbidity,** using the General Health Questionnaire (GHQ), where scores >=4 were taken to define a 'case' of psychiatric morbidity, and scores <4 a 'non-case'	Those with severe lack of social support had increased odds of psychiatric morbidity, adjusting for age and education (OR: 1.62; 95% CI: 1.05–2.52). Those with moderate lack of social support had no greater odds of psychiatric morbidity (OR: 0.87; 95% CI: 0.53–1.41). There was no evidence of an association between group participation and psychiatric morbidity (OR: 0.95; 95%: 0.88–1.03).
Daily crying							
Palese, 2018	Italy	Nursing home residents (n=8875)	None specified	Cross-sectional	**Social engagement,** using involvement in socially based activities	**Daily crying,** defined as the occurrence of at least one episode of crying daily over the last month	Residents involved in socially based activities (OR: 0.882; 95% CI 0.811–0.960) were less likely to cry on a daily basis.

QUESTION 2: Appendix

1) Manage Pain

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Almenkerk, 2015	The Netherlands	Nursing home residents with chronic stroke (n=274)	None specified	Cross-sectional	**Pain,** using Resident Assessment Instrument-Minimum Data (RAI MDS)	**Social engagement,** using RAI MDS Revised Index for Social Engagement (RISE)	Substantial pain was associated with low social engagement (OR: 4.25; 95% CI: 1.72–10.53; p<0.05], but only in residents with no/mild or severe cognitive impairment. This relation disappeared adjusted for Neuropsychiatric Inventory Questionnaire score (OR [OR: 1.95; 95%CI: 0.71–5.39].
Klapwijk, 2016	The Netherlands	Nursing home residents with dementia (n=288)	Inclusion: moderate to very severe dementia, using the Reisberg Global Deterioration Scale (Reisberg GDS) 5-7	Cross-sectional	**Pain,** using the Pain Assessment Checklist for Seniors with Limited Ability to Communicate; PACSLAC-D)	**Social relations,** using the QUALIDEM **Social isolation,** using the QUALIDEM	In unadjusted analysis, pain was associated with social relations [OR: 0.88; 95%CI: 0.83–0.94; p < 0.01] and social isolation [OR: 0.88; 95%CI: 0.82–0.94; p < 0.01]. In multivariate analysis (including neuropsychiatric symptoms), pain was not associated with social relations [OR: 0.97; 95%CI: 0.89–1.05; p = 0.40] or social isolation [OR: 0.96; 95%CI: 0.89–1.04; p = 0.31].
Lai, 2015	Hong Kong	Nursing home residents (n=125)	None specified	Cross-sectional	**Pain**	**Social relationships,** using the WHOQOL-BREF	Pain associated with lower social relationships score (p<0.001)

Lood, 2017	Sweden	Nursing home residents (n=4,451)	None specified	Cross-sectional	**Pain,** using the Pain Assessment in Advanced Dementia Scale	**Social engagement,** using a list of study-specific items on participation (e.g., going on an outing/excursion, having everyday conversations with staff not related to care)	Pain was correlated with less participation in social occupations ($p<0.01$), however, it was not statistically significant in the adjusted model.
Tse, 2013	Hong Kong	Nursing home residents (n=535)	Exclusion: mental disorder or cognitive impairment	Cross-sectional	**Pain,** using an 11-point numeric rating scale (NRS)	**Loneliness,** using the UCLA Loneliness Scale	In unadjusted analysis, pain was not associated with loneliness ($p=0.557$).
Tse, 2012	Hong Kong	Nursing home residents (n=302)	None specified	Cross-sectional	**Pain,** using the Geriatric Pain Assessment	**Loneliness,** using the UCLA Loneliness Scale	In unadjusted analysis, pain associated with higher loneliness ($p=0.05$).
Van Kooten, 2017*	The Netherlands	Nursing home residents (n=199)	Inclusion: diagnosis of dementia Exclusion: Huntington disease, Parkinson disease dementia, alcohol-related dementia, or cognitive deficits due to psychiatric disorders, or primarily mental disability	Cross-sectional	**Pain,** using the Mobilization Observation Behavior Intensity Dementia (MOBID-2) Pain Scale	**Social relations,** using the QUALIDEM	The association between pain and social relations was not statistically significant for mild ($p=0.25$) or moderate-severe pain ($p=0.25$).
Won, 2006	United States	Nursing home residents with persistent pain (n=10,372)	Exclusion: moderate to severe cognitive impairment based on a Cognitive Performance Scale (CPS) score of >2 (equivalent of <19 in MMSE)	Cohort	Analgesic use: Standing long-acting opioids (vs. standing-acting opioids; standing nonopioids; and no analgesics)	**Social engagement**, using RAI-MDS Index of Social Engagement	Standing long-acting opioids (vs. standing nonopioids) were associated with improvements in social engagement (propensity adjusted rate ratio 1.60; 95% CI, 1.02–2.48)

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Chibnall, 2005	United States	Nursing home residents with moderate-to-severe dementia (n=25)	Inclusion: moderate-to-severe dementia indicated by a stage 5 or 6 on the Functional Assessment Staging (FAST)	Yes	Randomized controlled trial, crossover	Analgesic medication (acetaminophen) (vs. placebo)	**Social interaction (direct and passive social involvement),** using Dementia Care Mapping (DCM) **Social withdrawal,** using DCM	Acetaminophen intervention group exhibited significant increases in direct social interaction (p = .05) and passive social involvement (p = 0.006).
Husebo, 2019	Norway	Nursing home residents (n=723)	None	Nursing homes randomized	Cluster-randomized controlled trial	Staff education and training on communication, systematic pain management, medication review and activities (vs. usual care)	**Social relations,** using the QUALIDEM **Social isolation,** using the QUALIDEM	During the follow-up (month 4 to month 9), there was an intervention effect for social relations (p<0.05)
Tse, 2012	China	Nursing home staff (n=147) and residents (n=535)	Exclusion: cognitive impairment and history of mental disorders	Nursing homes randomized	Quasi-experimental	Integrated pain management program (IPMP) that includes a physical exercise program and multisensory stimulation art and craft therapy for the residents (vs. usual care)	**Loneliness,** using the Chinese version of Revised UCLA Loneliness Scale	IPMP intervention residents group showed significantly lower perception in loneliness (p<0.001)
Tse, 2013	China	Nursing home staff (n=60) and residents (n=90)	Inclusion: oriented to time and place	Nursing homes randomized	Quasi-experimental	IPMP that included garden therapy and physiotherapy exercise for the residents (vs. usual care)	**Loneliness,** using the Chinese version of Revised UCLA Loneliness Scale	IPMP residents group showed significant decreases in loneliness (p<0.05)
Tse, 2016	China	Nursing home residents (n=50)	Inclusion: score ≥6 in the Abbreviated Mental Test.	Nursing homes randomized	Quasi-experimental (pilot study)	Group-based pain management program that included physical exercise, interactive teaching and sharing of pain management	**Loneliness,** using the Chinese version of Loneliness Scale	No significant difference in outcome measures between the two groups at both baseline

			Exclusion: cognitive impairment or mental disorders			education (vs. usual care)		(p=0.534) and at week 12 (p=0.083).

2) Address Vision and Hearing Impairments

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Achterberg, 2003	The Netherlands	Newly admitted nursing home residents (n=562)	None specified	Cross-sectional	**Vision impairment**, using the Resident Assessment Instrument- Minimum Data Set 2.0 (RAI-MDS) **Hearing impairment**, using RAI MDS	**Social engagement**, using RAI-MDS Index of Social Engagement	Vision impairment associated with low social engagement [OR: 1.7; 95%CI: 1.1–2.5; p=.011] but not hearing impairment [OR: 1.0; 95%CI: 0.7–1.6; p= 0.846]
Bliss, 2017	United States	New nursing home residents followed to 1-year (n=15,927)	None specified	Cohort	**Vision impairment**, using RAI-MDS	**Social engagement**, using RAI-MDS Index of Social Engagement one year after admission	Vision impairment associated with lower social engagement at 1-year follow-up (p<0.001)
Branco, 2007	United States	African American and white nursing home residents (n= 1,667)	None specified	Cross-sectional	**Vision impairment**, using RAI-MDS **Hearing impairment,** using RAI MDS	**Social engagement**, using RAI-MDS Index of Social Engagement	Stratified by racial/ethnic group: impaired vision associated with lower social engagement among whites (p<0.001) but not African Americans. Hearing impairment ns.
Guthrie, 2018	Canada	Long-term care (LTC) residents (n= 110,578)	None specified	Cross-sectional	**Vision impairment**, using RAI-MDS **Hearing impairment,** using RAI MDS **Dual sensory impairment,** using RAI MDS Deafblind Severity Index (DbSI)	**Social engagement**, using RAI-MDS Index of Social Engagement	Residents with cognitive impairment and dual sensory impairment (DSI) experienced the lowest rates, based on the raw proportions, on five of six Index of Social Engagement items.
Kang, 2012	United States	Nursing home residents with dementia (n=153)	Inclusion: diagnosis of Alzheimer's disease or other dementia, as recorded in their medical charts	Cross-sectional	**Vision impairment**, using RAI-MDS **Hearing impairment,** using RAI MDS	**Social engagement,** using the MDS-NH section F1 e Sense of Involvement/ Initiative	Vision impairment inversely associated with social engagement (p=0.039). Hearing impairment ns.

Li, 2014	United States	Nursing home residents (n= 868,011)	None specified	Cross-sectional	**Vision impairment**, using RAI-MDS **Hearing impairment,** using RAI MDS	**Social engagement**, using RAI-MDS Index of Social Engagement	Results suggest, when stratified by racial/ethnic group, highly or severely impaired vision and more than minimal difficulty hearing had lower social engagement for all groups.
Owsley, 2007	United States	Nursing home residents with cataracts (n=45)	Exclusion: moderate or severe cognitive impairment (MMSE score < 14)	Cohort	**Cataract surgery**	**Social interaction,** using the Nursing Home Vision-Targeted Health-Related Quality of Life Questionnaire (NHVQoL)	Cataract surgery group exhibited significant score improvements in social interaction (p = 0.033)
Resnick, 1997	United States	Nursing home residents (n=18,873)	None specified	Cross-sectional	**Vision impairment**, using RAI-MDS **Hearing impairment,** using RAI MDS	**Social engagement**, using RAI-MDS Index of Social Engagement	Vision: Minimal [OR: 1.19; 95%CI: 1.10-1.29], moderate [OR:1.40; 95% CI: 1.19-1.63] and severe vision impairment [OR: 1.51; 95% CI: 1.23-1.86] all associated with low social engagement. Hearing: Only severe hearing impairment [OR: 1.42; 95% CI: 1.10-1.83] associated with low social engagement.

Intervention studies

Author, year	**Country**	**Population (n=)**	**Inclusion/exclusion related to cognition**	**Randomized (yes/no)**	**Study design**	**Intervention**	**SOCIAL outcome**	**Study finding**
Owsley, 2007	United States	Nursing home residents (>55 years old) with uncorrected refractive error (n=142)	Exclusion: moderate or severe cognitive impairment (MMSE score < 14)	Yes	Randomized controlled trial	Immediate refractive error correction (vs. delayed correction)	**Social interaction,** using the Nursing Home Vision-Targeted Health-Related Quality of Life Questionnaire (NHVQoL)	At follow-up, refractive error group exhibited higher social interaction (p = 0.03)

3) Sleep at Night, Not During the Day

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Garms-Homolovà, 2010	Germany	Nursing home residents (n=2577)	None specified	Cross-sectional	**Sleep disturbances,** 'sleepless, has difficulty falling asleep or staying asleep' (insomnia) and 'non-restful sleep/tired in the morning' (NRS), using RAI MDS	**Social engagement,** using RAI MDS Index of Social Engagement (ISE)	Residents with sleep disturbances exhibited lower levels of social engagement.
Lai, 2015	Hong Kong	Nursing home residents (n=125)	None specified	Cross-sectional	**Sleep difficulty**	**Social relationships,** using the WHOQOL-BREF	Sleep difficulty was not associated with social relationships score.

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Alessi, 2005	United States	Nursing home residents with daytime sleepiness and nighttime sleep disruptions (n=118)	None specified	Yes	Randomized, Controlled Trial	Multiple nonpharmacological efforts to improve sleep, (i.e., decreased daytime in-bed time, 30 mins of outdoor sunlight exposure, increased physical activity and structured bedtime routine (vs. usual care)	**Social engagement,** using observations of participation in social activities and calculated as percentage of observations per day	Intervention group exhibited significant increases in social engagement (p = 0.001)

4) Find Opportunities for Creative Expression, like Art, Music and Storytelling

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Boersma, 2018	Netherlands	Residents with dementia (n=141) and their professional caregivers (n=136)	Inclusion: cognitive problems due to dementia	No	Quasi-experimental	Veder contact method, a person-centered method using theatrical, poetic and musical communication for application in 24-hr care that encourages social interaction (vs. usual care)	**Social relations,** using the QUALIDEM **Social isolation,** using the QUALIDEM	Implementation of VCM led to significant positive improvements in the residents' social relations (p=0.002). Social isolation ns.
Fritsch, 2009	United States	Nursing home residents with dementia and staff (2,088 ten-minute observation periods that were conducted in 20 nursing homes)	Inclusion: dementia	Nursing homes randomized	Post-only	TimeSlips program, a group storytelling program that encourages creative expression among persons with dementia, 10 – 12 residents met for 1 hour once per week for 10 weeks (vs. usual care)	**Social engagement,** using 10-minute, coded observations	There were higher levels of social engagement among residents in TimeSlips homes (p=0.003)
Van Dijk, 2012	Netherlands	Nursing home residents (n=169)	Inclusion: diagnosed dementia	No	Pretest post-test (3 group)	Veder Method for group theatre living-room activities with trained professional caregivers (group 1) or professional actors (group 2) (vs. regular reminiscence group activity (group 3))	**Social relations,** using the QUALIDEM **Social isolation,** using the QUALIDEM	At post-test, group 2 showed less socially isolated behavior (p=0.04). No difference in social relations.

Weiss, 1989	United States	Nursing home residents (n=49)	None specified	No	Pretest post-test	Textile art classes, for one hour three times per week over 8 weeks one hour, over an 8-week period.	**Social network,** using number of other residents in the nursing home a subject reported knowing by name **Social interaction**	Quality of social interaction was significantly higher in posttest (p=0.01). No difference in social network (p=0.14).

5) Exercise

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Vitorino, 2012	Brazil	Long-stay care facility residents (n=77)	None specified	Cross-sectional	**Physical activity,** yes or no	**Social relationships,** using the WHOQOL-BREF **Social participation,** using the WHOQOL-OLD	Physical activity was not associated with social relationships (p=0.561)
Wójcik, 2017	Poland	Nursing home residents (n=58)	None specified	Cross-sectional	**Participation in rehabilitation and satisfaction with its progress,** via questionnaire	**Social relationships,** using the WHOQOL-BREF	The association between participation in rehabilitation and quality of life was not statistically significant. The association between satisfaction with rehabilitation and social relationships was statistically significant (p= 0.01)

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Barthalos, 2016	Hungary	Nursing home residents (n=45)	Exclusion: moderate or severe cognitive impairment (MMSE score < 15)	No	Pretest posttest (3 groups)	Physical activity, resistance training 45-minutes twice per week vs. physical + mental activity (weekly lectures and discussions on aging and quality of life) vs. control (no physical or mental training)	**Social participation,** using the WHOQOL-OLD	Both physical activity (p=0.004) and physical + mental activity (p=0.004) groups improved in social participation
Castilho-Weinert, 2014	Brazil	Nursing home residents (n=43)	None specified	No	Pretest postest	Physical therapy program, recreational dynamic activities and psychomotor circuits, 30-minutes per week for 16 weeks	**Social relationships,** using the WHOQOL-BREF	There was no change in social relations (p=0.384)

Tse, 2014	China	Nursing home residents with chronic pain (n=396)	Exclusion: cognitive impairment	Nursing homes randomized	Pretest–posttest (2 groups)	Physical exercise program, consisting of muscle strengthening, stretching, and massages, 1-hour per week for 8 weeks (vs. no treatment control)	**Loneliness,** using the Chinese version of UCLA Loneliness Scale	The intervention group showed significant decrease in loneliness ($p<0.05$) and the control group did not show any significant improvement.

6) Maintain Religious Observations

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Branco, 2007	United States	African American (n=172) and white (n=1595) nursing home residents	None specified	Cross-sectional	**Religious activities,** using RAI MDS **Strength from faith**, using RAI MDS	**Social engagement**, using RAI MDS Index of Social Engagement (ISE)	Among both African American and white residents, strength from faith ($p < 0.01$) and religious activity preference ($p < 0.001$) were positively associated with social engagement.
Bliss, 2017	United States	New nursing home residents followed to 1-year (n=15,927)	None specified	Cohort	**Spirituality**, using RAI MDS	**Social engagement**, using RAI-MDS Index of Social Engagement one year after admission	Spirituality not associated with social engagement at 1-year follow-up (p=0.06).
Koenig, 1997	United States	Nursing home residents (n=115)	None specified	Cross-sectional	**Religious coping,** using the Religious Coping Index (RCI)	**Social support,** using frequency of visitors, frequency of other contacts, intimacy with staff and intimacy with visitors	Religious coping was positively associated with social support (p=0.01)

7) Garden, either Indoors or Outside

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Brown, 2004	United States	Nursing home residents (n=66)	Inclusion: could cognitively comprehend and answer questions	No	Pre and post test	Indoor gardening program once a week for 5 weeks (vs. twice a week for 2 weeks)	**Loneliness,** using the UCLA Loneliness Scale **Social support,** using the revised Social Provisions Scale	There were no significant differences in social support or loneliness between participant groups.
Chen, 2015	Taiwan	Nursing home residents (n=10)	Exclusion: diagnosed cognitive impairment	No	Pre and post test (1 group)	10-week indoor horticultural program once a week	**Loneliness,** using the UCLA Loneliness Scale, Version 3	Loneliness decreased from baseline to follow up at weeks 5 and 10 ($p < .001$).
Chu, 2019	Taiwan	Nursing home residents (n=150)	Exclusion: cognitive impairment (MMSE < 25)	Yes	Randomized controlled trial	8-week horticultural program (vs. usual care)	**Loneliness,** using the 20-item UCLA Loneliness Scale, Version 3	The mean score for loneliness in the experimental group significantly decreased over time ($p < .001$), but the mean score for loneliness in the control group increased ($p < .001$).
Lai, 2018	Hong Kong	Frail and prefrail nursing home residents (n=111)	Inclusion: normal cognition (Chinese Abbreviated Mental Test score of greater than 5) or mild cognitive impairment (questionable or mild dementia according to the Clinical Dementia Rating scale)	Yes	Randomized controlled trial	8-week horticulture program (vs. social activities)	**Social engagement,** using the Index of Social Engagement **Social network,** using the Lubben Social Network Scale	There was no statistically significant difference over time between the groups.
Tse, 2010	Hong Kong	Nursing home residents (n=53)	Inclusion: cognitively intact	Nursing homes randomized	Pre and post test (2 groups)	8-week indoor gardening program (vs. usual care)	**Loneliness,** using the Revised UCLA Loneliness Scale	There were significant increases in social networks ($p<0.01$) and reductions in loneliness ($p<0.01$) for the

							Social network, using the Lubben Social Network Scale	experimental groups but not the control groups (p>0.05).

8) Visit with Pets

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Calvert, 1989	United States	Nursing home residents (n=65)	Inclusion: pass mental screening (correctly answering 3 items from the Pfieffer's Short Portable Mental Status Questionnaire)	Cross-sectional	Pet interaction (in pet programs), categorized into high vs. low pet interaction groups	**Loneliness,** using the UCLA Loneliness Scale	Those in the high pet interaction group were statistically and significantly less lonely than those in the low pet interaction group (p=0.03)

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Banks, 2002	United States	Long-term care residents (n=45)	Inclusion: no diagnosis of cognitive impairment and an MMSE score of 24 or greater	Yes	Randomized controlled trial	Animal assisted (AAT) once per week vs. AAT three times per week vs. no AAT	**Loneliness,** using the UCLA Loneliness Scale	Both AAT intervention groups showed lower loneliness than control group (p<0.05) both the two AAT groups did not differ from each other.
Banks, 2005	United States	Long-term care residents (n=37)	Exclusion: cognitive impairment (MMSE < 24)	Yes	Randomized controlled trial	Animal-assisted therapy (AAT) group vs. AAT individual, all 30-minute sessions once per week	**Loneliness,** using the UCLA Loneliness Scale	Loneliness decreased for AAT individual (p<0.05) but difference was not statistically significant for AAT group. Posttest scores did not differ between groups.
Bernstein, 2000	United States	Long-term care residents (n=33)	None specified	No	Observational	AAT vs. Arts and Crafts and AAT vs. Snack Bingo	**Social interaction,** using observation (brief conversation, long conversation, touch)	Cognitively alert patients in AAT groups showed more brief conversation (p<0.01) and long conversation (p<0.01) but less touch. They also initiated brief conversation more frequently (p=0.009) Semi-alert/non-alert patients in AAT showed

								less brief conversation, but more long conversation.
Martindale, 2008	United States	Nursing home residents (n=20)	Included.	No	quasi-experimental	Animal-assisted therapy, five one-hour sessions over 6 weeks (vs. traditional recreation therapy activities)	**Social interaction,** using observation of interacting with people and the Passivity in Dementia Scale	Interacting with people was significantly greater for the AAT group (p=0.032)
Phelps, 2008	United States	Nursing home resident (n=5)	Exclusion: diagnosed dementia; cognitive impairment (MMSE score < 24)	No	?	Dog visits, 5-10 minutes once each week for 6 weeks	**Social interaction,** using observational frequency of verbal and nonverbal interaction with other residents and with the dog	Dog visits had no significant effect on social interaction
Richeson, 2003	United States	Nursing home residents with dementia (n=15)	Inclusion: diagnosed dementia; moderate or severe cognitive impairment (MMSE < 16)	No	Pretest and post-test (1 group)	Animal-assisted therapy, 1 hour five days per week for 3 weeks	**Social interaction,** using a data collection tool to determine if social interactions increase after interactions with therapy dogs and their handlers	Social interaction increased pretest to posttest (p<0.05)
Sollami, 2017	Italy	Nursing home residents (n=28)	Inclusion: mild or absent cognitive impairment (as assessed by MMSE)	Yes	Pretest and post-test (2 groups)	Animal-assisted intervention, one hour two times per week for 16 sessions (vs. control, usual care)	**Loneliness,** using the UCLA Loneliness Scale **Social interaction,** using the Quality of Life Scale in Late-Stage Dementia (QUALID)	Intervention group showed significantly decreased loneliness (p=0.001) and improved positive social interactions (p=0.001)
Vrbanac, 2013	Croatia	Nursing home residents (n=21)	None specified	No	Pretest and post-test (1 group)	Animal-assisted therapy, 90-minutes three times per week for 6 months	**Loneliness,** using the UCLA Loneliness Scale	Loneliness decreased after animal-assisted therapy (p=0.003)

Wallace, 1987	United States	Semi-ambulatory nursing home residents (n=8)	None specified	No	?	Pet visitation program, 15-minutes, three times per week for 8-weeks (comparing weeks when pet visitations were made with weeks when only the experimenter was present)	**Social interaction,** using a behavioural activity questionnaire	Only a significant effect of visitations ($p< 0.01$) indicating, that visits, either with or without pets, increased social interaction
Wesenberg, 2019	Germany	Nursing home residents with mild to moderate dementia (n=19)	Inclusion: diagnosed Alzheimer's disease or vascular dementia	No	Pretest post-test (2 groups)	Animal-assisted intervention with a dog, once per week for 6 months (vs. control intervention without dogs)	**Social interaction,** using observational frequency; divided into verbal interaction, touch, non-verbal interaction and body posture	During the animal-assisted intervention, significantly longer and more frequent periods of social interaction (e.g. touch, body movements) were observed than during the control intervention.
Winkler, 1989	Australia	Nursing home residents (n=21)	None specified	No	Pretest post-test (1 group)	Resident dog	**Social interaction,** using observation Sanson-Fisher behavioural observation instrument, including group behaviours	Six weeks after the dog's arrival, a significant increase in frequency of interactive behaviors was seen. By 22 weeks, behaviors had reverted to baseline levels.

9) Use Technology to Communicate

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Neves, 2018	Canada	Long-term care home that mainly caters to Chinese Canadians (n=5 residents and n=5 relatives)	Exclusion: dementia	No	Feasibility study	An accessible communication app	**Social support,** using the Abbreviated Duke Social Support Index **Social interaction,** using the Abbreviated Duke Social Support Index **Loneliness,** using the short revised UCLA Loneliness Scale	Increases in social support (p=0.105)and social interaction (p=0.097) were not statistically significant. Loneliness ns. Note: feasibility study, small sample.
Siniscarco, 2017	United States	Long-term care facility residents (n=8)	Exclusion: cognitive impairment (MMSE < 24)	No	Pilot study, pre-test/ post-test	Videoconferencing (one or more times per week for two months)	**Loneliness (emotional),** using DeJong Gierveld Loneliness Scale **Social isolation,** using PROMIS instruments **Social support (emotional and informational),** using PROMIS instruments	Emotional loneliness and social isolation decreased slightly, but not significantly. Emotional support and informational support increased slightly, but not significantly. Note: small sample.
Tsai, 2010	Taiwan	Nursing home residents (n=57)	Exclusion: moderate or severe cognitive impairment (MMSE < 16 for those with no formal education or MMSE < 20 for those with at least a primary school education)	Nursing homes randomized	quasi-experimental	Videoconferencing (at least five minutes per week for three months) vs. regular care only	**Social support,** using the Social Supportive Behavior Scale **Loneliness,** using the UCLA Loneliness Scale	Subjects in the experimental group had significantly higher mean emotional and appraisal social support scores at one week and three months after baseline (compared to control group). Subjects in the experimental group also had lower mean loneliness scores at one week and

								three months after baseline.
Tsai, 2011	Taiwan	Nursing home residents (n=90)	Exclusion: moderate or severe cognitive impairment (MMSE < 16 for those with no formal education or MMSE < 20 for those with at least a primary school education)	Nursing homes randomized	quasi-experimental	Videoconferencing (at least five minutes per week for three months) vs. regular care only	**Social support,** using the Social Supportive Behavior Scale and including emotional, informational, instrumental, and appraisal support **Loneliness,** using the UCLA Loneliness Scale	Videoconference program had a long-term effect in alleviating loneliness and improved long-term emotional social support and short-term appraisal support, but decreased residents' instrumental social support. There was no effect on informational social support.

10) Laugh Together

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Kuru-Alici, 2018	Turkey	Nursing home residents (n=50)	Exclusion: Alzheimer's disease or other dementia	No	Pretest–posttest (two group)	Laughter therapy, 35-40 minutes twice per week for 5 weeks (vs. control, no intervention)	**Loneliness (emotional and social),** using the De Jong Gierveld Loneliness Scale	Intervention associated with decreased emotional and social loneliness with statistically significant difference from control group ($p<0.001$)
Low, 2013	Australia	Nursing home residents (n=398)	None specified	Yes	Cluster randomized controlled trial	Humour therapy from professional performers (ElderClowns + Laughterbosses), for 2 hours once per week for 9-12 weeks (vs. usual care)	**Social disengagement,** using the Multidimensional Observation Scale for Elderly Subjects (MOSES)	Groups did not differ significantly over time on social disengagement ($p>0.05$)
Tse, 2010	China	Nursing home residents with chronic pain (n=70)	Inclusion: cognitively intact (indicated by a score $\leq$ 8 on the abbreviated mental test)	No	Pretest–posttest (two group)	Humour therapy program, one hour per week for 8 weeks (vs. control)	**Loneliness,** using the revised UCLA Loneliness Scale	Intervention group showed significant decreases in loneliness ($p<0.001$) but not for the control group; however, difference between groups was not statistically significant

11) Reminisce About Events, People and Places

Intervention studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Randomized (yes/no)	Study design	Intervention	SOCIAL outcome	Study finding
Chiang, 2010	Taiwan	Institutionalized residents (n=92)	Exclusion: moderate or severe cognitive impairment (MMSE < 19)	Yes	Randomized controlled trial	Reminiscence therapy 90 mins per week for 8 weeks (vs. wait list control)	**Loneliness,** using the Revised UCLA Loneliness Scale	Intervention group showed a decrease in loneliness, with significant difference between groups ($p<0.0001$)
Lai, 2004	China	Nursing home residents with dementia (n=101)	Inclusion: dementia diagnosis	Yes	Randomized controlled trial	Individual life story book to encourage reminiscence once per week for 6 weeks vs. comparison (social contacts) vs. control (no program)	**Social engagement,** using the Social Engagement Scale	There were no statistically significant differences in social engagement between the groups.
Schafer, 1985	United States	Nursing home residents (n=185)	None specified	No	Pretest and posttest (4 group)	Three intervention groups (1 hour per week for 12 weeks): (1) audio tapes + structured group intervention; (2) structured group intervention, and (3) audio tapes + individual activity vs. control (no treatment)	**Social network,** using the ratio of the number of other participants a subject knew divided by total number of people **Social engagement,** using the spontaneous initiation of activities with other residents **Social support,** using whether resident reports there was someone in whom they could confide	There were statistically significant differences between the groups for social network ($p=0.02$) and social engagement ($p=0.02$) Group 2 associated with increased social network and the highest social engagement. Social support ns.

Serrani-Azcurra, 2012	Argentina	Nursing home residents with dementia (n=135)	Inclusion: diagnosed with Alzheimer's disease and Folstein Minimental exam score above 10	Yes	Randomized controlled trial	Life-approach reminiscence therapy, 1 hour bi-weekly for 12 weeks vs. active control (counseling and informal social contacts) vs. passive control (no intervention)	**Social engagement**, using the Social Engagement Scale	Social engagement increased in the intervention group, with significant difference between groups (p<0.01)
Siverova, 2014	Czech Republic	Hospitalized long term care elderly patients (n=41)	Inclusion: mild or moderate cognitive impairment (9 < MMSE < 24)	No	Pretest posttest (1 group)	Narrative group reminiscence therapy, 40-60 minutes once per week for 6-8 weeks	**Social relationships,** using the WHOQOL-BREF **Social participation,** using the WHOQOL-OLD	Intervention was not associated with change in social relationships (p=0.6331) but there was an increase in social participation (p=0.0019)
Siverova, 2018	Czech Republic	Older adults in institutional care (n=116)	Inclusion: mild or moderate cognitive impairment (10 < MMSE < 24)	No	Quasi-experimental pretest/post-test control group design	Group narrative reminiscence therapy, 40-60 minutes per week for 8 weeks (vs. standard care)	**Social relationships,** using the WHOQOL-BREF **Social participation,** using the WHOQOL-OLD	There were no statistically significant differences in social relationships. The intervention group showed an increase in social participation, with a significant difference with control group (p=0.041).
Tabourne, 1995	United States	Nursing home residents (n=40)	Inclusion: diagnosis of Alzheimer's disease or other cognitive disorder	No	Pretest posttest (2 groups)	Life review program, two sessions per week for twelve weeks vs. control	**Social interaction,** using observer ratings	There was a significant increase in social interaction for the experimental group (p<0.001) but not for the control group; the pre/post-test differences between groups was statistically significant (p < .001)

12) Communicate Non-verbally

Observational studies

Author, year	Country	Population (n=)	Inclusion/exclusion related to cognition	Study design	Exposure	SOCIAL outcome	Study finding
Ballard, 2001	England	Care facility (residential and nursing homes) residents (n=112)	Inclusion: dementia, using AGECAT ("organic disorder") and the Clinical Dementia Rating Scale (CDR) category of 0.5 or greater	Cross-sectional	**Language function,** using Sheffield Screening Test for Acquired Language Disorders	**Social withdrawal,** using Dementia Care Mapping (DCM)	Greater impairment of receptive language was associated with increased social withdrawal (p = .03)
Bliss, 2017	United States	New nursing home residents followed to 1-year (n=15,927)	None specified	Cohort	**Communication difficulty**, using RAI-MDS	**Social engagement**, using RAI-MDS Index of Social Engagement one year after admission	Communication difficulty associated with low social engagement at 1-year follow-up (p<0.001).
Li, 2014	United States	Nursing home residents (n= 868,011)	None specified	Cross-sectional	**Communication difficulty,** using RAI MDS	**Social engagement**, using individual items from RAI MDS Index of Social Engagement (ISE)	Communication difficulty associated with lower social engagement.
Potkins, 2003	England	Nursing home and social care facility residents (n=315)	Inclusion: dementia, using AGECAT ("organic disorder") and the Clinical Dementia Rating Scale (CDR) category of 0.5 or greater	Cross-sectional	**Expressive and receptive language function,** using the Sheffield Screening Test for Acquired Language Disorders	**Social withdrawal,** using Dementia Care Mapping (DCM) **Social engagement,** using participation in social activities and Dementia Care Mapping (DCM)	Both expressive (p=0.04) and receptive aspects of language (p < 0.01) were correlated with decreased participation in social activities. Social withdrawal was only correlated with receptive language difficulties (p= 0.01)
Resnick, 1997	United States	Nursing home residents (n=18,873)	None specified	Cross-sectional	**Communication difficulty,** using RAI MDS	**Social engagement**, using individual items from RAI MDS Index of Social Engagement (ISE)	Communication difficulty [OR: 1.72; 95% CI: 1.51-1.95] associated with low social engagement.

REFERENCES

1. Amy T. Hsu, Natasha Lane, Samir K. Sinha, Julie Dunning, Misha Dhuper, Zaina Kahiel, et al. Impact of COVID-19 on residents of Canada's long-term care homes – ongoing challenges and policy responses. International Long-Term Care Policy Network. 2020.
2. Holt-Lunstad J, Smith TB, Baker M, Harris T, Stephenson D. Loneliness and Social Isolation as Risk Factors for Mortality:A Meta-Analytic Review. Perspectives on Psychological Science. 2015;10(2):227-37.
3. Kelly ME, Duff H, Kelly S, McHugh Power JE, Brennan S, Lawlor BA, et al. The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: a systematic review. Syst Rev. 2017;6(1):259-.
4. Valtorta NK, Kanaan M, Gilbody S, Ronzi S, Hanratty B. Loneliness and social isolation as risk factors for coronary heart disease and stroke: systematic review and meta-analysis of longitudinal observational studies. Heart. 2016;102(13):1009-16.
5. Bradshaw SA, Playford ED, Riazi A. Living well in care homes: a systematic review of qualitative studies. Age and Ageing. 2012;41(4):429-40.
6. Moyle W, Fetherstonhaugh D, Greben M, Beattie E, AusQo Lg. Influencers on quality of life as reported by people living with dementia in long-term care: a descriptive exploratory approach. BMC geriatrics. 2015;15:50-.
7. Cahill S, Diaz-Ponce AM. 'I hate having nobody here. I'd like to know where they all are': Can qualitative research detect differences in quality of life among nursing home residents with different levels of cognitive impairment? Aging & Mental Health. 2011;15(5):562-72.
8. Pinquart M, Sörensen S. Influences on loneliness in older adults: A meta-analysis. Basic and Applied Social Psychology. 2001;23(4):245-66.
9. Ontario Long Term Care Association. This is Long-Term Care 2018 2018 [Available from: https://www.oltca.com/OLTCA/Documents/Reports/ThisIsLongTermCare2018.pdf.
10. Mick P, Parfyonov M, Wittich W, Phillips N, Guthrie D, Kathleen Pichora-Fuller M. Associations between sensory loss and social networks, participation, support, and loneliness: Analysis of the Canadian Longitudinal Study on Aging. Can Fam Physician. 2018;64(1):e33-e41.
11. Schroll M, Jónsson PV, Berg K, Sherwood S. An International Study of Social Engagement Among Nursing Home Residents. Age and Ageing. 1997;26(suppl_2):55-9.
12. Bethell J, Babineau J, Iaboni A, Grenn R, Cuaresma-Canlas R, Karunananthan R, et al. Social integration and loneliness among long term care residents: protocol for a scoping review. BMJ Open. 2019;Revisions requested.
13. Munn Z, Peters MDJ, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Medical Research Methodology. 2018;18(1):143.
14. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International Journal of Social Research Methodology. 2005;8(1):19-32.
15. Levac D, Colquhoun H, O'Brien KK. Scoping studies: advancing the methodology. Implementation science : IS. 2010;5:69-.
16. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA Extension for Scoping Reviews (PRISMA-ScR): Checklist and ExplanationThe PRISMA-ScR Statement. Annals of Internal Medicine. 2018;169(7):467-73.
17. Leedahl SN, Sellon A, Chapin RK. Assessment of multiple constructs of social integration for older adults living in nursing homes. Journal of Gerontological Social Work. 2018;61(5):526-48.
18. Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Social Science & Medicine. 2000;51(6):843-57.

19. Glass TA, de Leon CM, Marottoli RA, Berkman LF. Population based study of social and productive activities as predictors of survival among elderly Americans. BMJ (Clinical research ed). 1999;319(7208):478-83.
20. Bassuk SS, Glass TA, Berkman LF. Social Disengagement and Incident Cognitive Decline in Community-Dwelling Elderly Persons. Annals of Internal Medicine. 1999;131(3):165-73.
21. Machielse A. The Heterogeneity of Socially Isolated Older Adults: A Social Isolation Typology. Journal of Gerontological Social Work. 2015;58(4):338-56.
22. Leedahl SN, Chapin RK, Little TD. Multilevel Examination of Facility Characteristics, Social Integration, and Health for Older Adults Living in Nursing Homes. The Journals of Gerontology: Series B. 2014;70(1):111-22.
23. De Jong Gierveld J, Van Tilburg T. The De Jong Gierveld short scales for emotional and social loneliness: tested on data from 7 countries in the UN generations and gender surveys. European journal of ageing. 2010;7(2):121-30.
24. Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. J Health Soc Behav. 2009;50(1):31-48.
25. Sanford AM OM, Tolson D, Abbatecola AM, Arai H, Bauer JM, Cruz-Jentoft AJ, Dong B, Ga H, Goel A, Hajjar R, Holmerova I, Katz PR, Koopmans RT, Rolland Y, Visvanathan R, Woo J, Morley JE, Vellas B. An international definition for "nursing home". J Am Med Dir Assoc. 2015;16(3):181-4.
26. Mikkelsen ASB, Petersen S, Dragsted AC, Kristiansen M. Social Interventions Targeting Social Relations Among Older People at Nursing Homes: A Qualitative Synthesized Systematic Review. Inquiry : a journal of medical care organization, provision and financing. 2019;56:46958018823929-.
27. Quan NG, Lohman MC, Resciniti NV, Friedman DB. A systematic review of interventions for loneliness among older adults living in long-term care facilities. Aging Ment Health. 2019:1-11.
28. Brimelow RE, Wollin JA. Loneliness in old age: Interventions to curb loneliness in long-term care facilities. Activities, Adaptation & Aging. 2017;41(4):301-15.
29. Ejaz FK, Rose MS, Jones J. Restraint removal and changes in social response among nursing home residents. Research on Social Work Practice. 1998;8(1):47-62.
30. Smith-Marchese K. Effects of participatory music on the reality orientation and sociability of Alzheimer's residents in a long-term-care setting. Activities, Adaptation and Aging. 1994;18(2):41-55.
31. Sauer PE, Fopma-Loy J, Kinney JM, Lokon E. "It makes me feel like myself": Person-centered versus traditional visual arts activities for people with dementia. Dementia. 2016;15(5):895-912.
32. Phillips LJ, Reid-Arndt SA, Pak Y. Effects of a creative expression intervention on emotions, communication, and quality of life in persons with dementia. Nursing Research. 2010;59(6):417-25.
33. Fick KM. The influence of an animal on social interactions of nursing home residents in a group setting. American Journal of Occupational Therapy. 1993;47(6):529-34.
34. Perelle IB, Granville DA. Assessment of the effectiveness of a pet facilitated therapy program in a nursing home setting. Society & Animals: Journal of Human-Animal Studies. 1993;1(1):91-100.
35. Cohen-Mansfield J, Marx MS, Dakheel-Ali M, Regier NG, Thein K. Can persons with dementia be engaged with stimuli? American Journal of Geriatric Psychiatry. 2010;18(4):351-62.
36. Cohen-Mansfield J, Thein K, Marx MS, Dakheel-Ali M, Murad H, Freedman LS. The relationships of environment and personal characteristics to agitated behaviors in nursing home residents with dementia. Journal of Clinical Psychiatry. 2012;73(3):392-9.
37. Cohen-Mansfield J, Dakheel-Ali M, Marx MS. Engagement in persons with dementia: The concept and its measurement. American Journal of Geriatric Psychiatry. 2009;17(4):299-307.
38. O'Rourke HM, Collins L, Sidani S. Interventions to address social connectedness and loneliness for older adults: a scoping review. BMC Geriatrics. 2018;18(1):214.
39. Marston C, Renedo A, Miles S. Community participation is crucial in a pandemic. Lancet. 2020;395(10238):1676-8.

40. Bramer WM, Giustini D, de Jonge GB, Holland L, Bekhuis T. De-duplication of database search results for systematic reviews in EndNote. J Med Libr Assoc. 2016;104(3):240-3.
41. Ahmed D, El Shair IH, Taher E, Zyada F. Prevalence and predictors of depression and anxiety among the elderly population living in geriatric homes in Cairo, Egypt. Journal of the Egyptian Public Health Association. 2014;89(3):127-35.
42. Chau R, Kissane DW, Davison TE. Risk Factors for Depression in Long-term Care: A Prospective Observational Cohort Study. Clinical Gerontologist. 2019:1-14.
43. Cheng ST, Lee CK, Chow PK. Social support and psychological well-being of nursing home residents in Hong Kong. International Psychogeriatrics. 2010;22(7):1185-90.
44. Drageset J, Eide GE, Ranhoff AH. Anxiety and depression among nursing home residents without cognitive impairment. Scandinavian Journal of Caring Sciences. 2013;27(4):872-81.
45. Farber HJ, Brod M, Feinbloom RI. Primary family contacts and emotional health in the institutionalized elderly. Family Practice Research Journal. 1991;11(3):309-17.
46. Fessman N, Lester D. Loneliness and depression among elderly nursing home patients. International Journal of Aging & Human Development. 2000;51(2):137-41.
47. Gan P, Xie Y, Duan W, Deng Q, Yu X. Rumination and Loneliness Independently Predict Six-Month Later Depression Symptoms among Chinese Elderly in Nursing Homes. PLoS ONE [Electronic Resource]. 2015;10(9):e0137176.
48. Hjaltadóttir I, Ekwall AK, Nyberg P, Hallberg IR. Quality of care in Icelandic nursing homes measured with Minimum Data Set quality indicators: Retrospective analysis of nursing home data over 7 years. International Journal of Nursing Studies. 2012;49(11):1342-53.
49. Hollinger-Smith L, Buschmann M. Failure to thrive syndrome: Predicting elderly nursing home residents at risk. Clinical Gerontologist. 2000;20(4):65-88.
50. Ya-Chuan H, Wright CL. The association between participation in social activity and depressive symptoms in institutionalized elders in Taiwan. Geriatric Nursing. 2014;35(1):31-6.
51. Jongenelis K, Pot A, Eisses A, Beekman A, Kluiter H, Ribbe M. Prevalence and risk indicators of depression in elderly nursing home patients: The AGED study. Journal of Affective Disorders. 2004;83(2-3):135-42.
52. Kim O, Byeon Y, Kim J, Endo E, Akahoshi M, Ogasawara H. Loneliness, depression and health status of the institutionalized elderly in Korea and Japan. Asian Nursing Research. 2009;3(2):63-70.
53. Kroemeke A, Gruszczynska E. Well-being and institutional care in older adults: Cross-sectional and time effects of provided and received support. PLoS ONE. 2016;11 (8) (no pagination)(e0161328).
54. Krohn B, Bergman-Evans B, Mezey M. Research brief. An exploration of emotional health in nursing home residents: making the pieces fit. Applied Nursing Research. 2000;13(4):214-7.
55. Kwok SY, Yeung DY, Chung A. The moderating role of perceived social support on the relationship between physical functional impairment and depressive symptoms among Chinese nursing home elderly in Hong Kong. Thescientificworldjournal. 2011;11:1017-26.
56. Lin P-C, Wang H-H, Huang H-T. Depressive symptoms among older residents at nursing homes in Taiwan. Journal of Clinical Nursing. 2007;16(9):1719-25.
57. Leedahl SN, Chapin RK, Little TD. Multilevel examination of facility characteristics, social integration, and health for older adults living in nursing homes. Journals of Gerontology Series B-Psychological Sciences & Social Sciences. 2015;70(1):111-22.
58. Lou VWQ, Chi I, Kwan CW, Leung AYM. Trajectories of social engagement and depressive symptoms among long-term care facility residents in Hong Kong. Age and Ageing. 2013;42(2):215-22.
59. Nikmat AW, Hashim NA, Omar SA, Razali S. Depression and loneliness/social isolation among patients with cognitive impairment in nursing home. ASEAN Journal of Psychiatry. 2015;16(2):222-31.
60. Patra P, Alikari V, Fradelos EC, Sachlas A, Kourakos M, Rojas Gil AP, et al. Assessment of Depression in Elderly. Is Perceived Social Support Related? A Nursing Home Study : Depression and Social Support in Elderly. Advances in Experimental Medicine & Biology. 2017;987:139-50.

61. Somporn D, Neeser KJ, Iamsupasit S. Factors influencing depression among elderly in Ban Bangkhae nursing homes, Bangkok, Thailand after flooding. Journal of Health Research. 2012;26(6):313-6.
62. Tank Buschmann M, Hollinger LM. Influence of social support and control on depression in the elderly. Clinical Gerontologist. 1994;14(4):13-28.
63. Tiong WW, Yap P, Koh GCH, Fong NP, Luo N. Prevalence and risk factors of depression in the elderly nursing home residents in Singapore. Aging & Mental Health. 2013;17(6):724-31.
64. Tosangwarn S, Clissett P, Blake H. Predictors of depressive symptoms in older adults living in care homes in Thailand. Archives of Psychiatric Nursing. 2018;32(1):51-6.
65. Tsai Y-F, Chung JWY, Wong TKS, Huang C-M. Comparison of the prevalence and risk factors for depressive symptoms among elderly nursing home residents in Taiwan and Hong Kong. International Journal of Geriatric Psychiatry. 2005;20(4):315-21.
66. Tu YY, Lai YL, Shin SC, Chang HJ, Li L. Factors Associated with Depressive Mood in the Elderly Residing at the Long-Term Care Facilities. International Journal of Gerontology.
67. Yeung JWK, Ching KLY, Chung A. Correlates and prevalence of depression in Chinese residents of nursing homes in Hong Kong and implications for services and intervention policies. Ljetopis Socijalnog Rada. 2011;17(3):445-60.
68. Zhao X, Zhang D, Wu M, Yang Y, Xie H, Li Y, et al. Loneliness and depression symptoms among the elderly in nursing homes: A moderated mediation model of resilience and social support. Psychiatry Research. 2018;268:143-51.
69. McCurren C, Dowe D, Rattle D, Looney S. Depression among nursing home elders: testing an intervention strategy. Applied Nursing Research. 1999;12(4):185-95.
70. de Guzman AB, Jurado JBN, Juson AJA. Examining the Structural Relationship of Chronic Illness, Physical Function, Life Satisfaction, and Social Support in the Development of Depression Among Filipino Elderly in Institutionalized Settings. Educational Gerontology. 2015;41(3):193-206.
71. Potter R, Sheehan B, Cain R, Griffin J, Jennings PA. The Impact of the Physical Environment on Depressive Symptoms of Older Residents Living in Care Homes: A Mixed Methods Study. Gerontologist. 2018;58(3):438-47.
72. Pramesona BA, Taneepanichskul S. Prevalence and risk factors of depression among Indonesian elderly: A nursing home-based cross-sectional study. Neurology Psychiatry and Brain Research. 2018;30:22-7.
73. Segal DL. Relationships of assertiveness, depression, and social support among older nursing home residents. Behavior Modification. 2005;29(4):689-95.
74. Van Beek APA, Frijters DHM, Wagner C, Groenewegen PP, Ribbe MW. Social engagement and depressive symptoms of elderly residents with dementia: A cross-sectional study of 37 long-term care units. International Psychogeriatrics. 2011;23(4):625-33.
75. Keister KJ. Predictors of self-assessed health, anxiety, and depressive symptoms in nursing home residents at week 1 postrelocation. Journal of Aging & Health. 2006;18(5):722-42.
76. Chen Y-L, Ryden MB, Feldt K, Savik K. The relationship between social interaction and characteristics of aggressive, cognitively impaired nursing home residents. American Journal of Alzheimer's Disease. 2000;15(1):10-7.
77. Cohen-Mansfield J, Werner P, Marx MS. Screaming in nursing home residents. Journal of the American Geriatrics Society. 1990;38(7):785-92.
78. Draper B, Snowdon J, Meares S, Turner J, Gonski P, McMinn B, et al. Case-controlled study of nursing home residents referred for treatment of vocally disruptive behavior. International Psychogeriatrics. 2000;12(3):333-44.
79. Cohen-Mansfield J, Marx MS. The social network of the agitated nursing home resident. Research on Aging. 1992;14(1):110-23.
80. Marx MS, Cohen-Mansfield J, Werner P. A profile of the aggressive nursing home resident. Behavior, Health, & Aging. 1990;1(1):65-73.

81. Livingston G, Barber J, Marston L, Rapaport P, Livingston D, Cousins S, et al. Prevalence of and associations with agitation in residents with dementia living in care homes: MARQUE cross-sectional study. BJPsych Open. 2017;3(4):171-8.
82. Kolanowski A, Litaker M. Social interaction, premorbid personality, and agitation in nursing home residents with dementia. Archives of Psychiatric Nursing. 2006;20(1):12-20.
83. Choi H, Jung YI, Kim H. Factors related to aggressive behaviors among older adults in nursing homes of Korea: A cross-sectional survey study. International Journal of Nursing Studies. 2018;88:9-15.
84. Beerens HC, Zwakhalen SM, Verbeek H, Tan FE, Jolani S, Downs M, et al. The relation between mood, activity, and interaction in long-term dementia care. Aging & Mental Health. 2018;22(1):26-32.
85. Gilbart EE, Hirdes JP. Stress, social engagement and psychological well-being in institutional settings: Evidence based on the minimum data set 2.0. Canadian Journal on Aging. 2000;19(SUPPL. 2):50-66.
86. Jao Y-L, Loken E, MacAndrew M, Van Haitsma K, Kolanowski A. Association between social interaction and affect in nursing home residents with dementia. Aging & Mental Health. 2018;22(6):778-83.
87. Lee KH, Boltz M, Lee H, Algase DL. Does Social Interaction Matter Psychological Well-Being in Persons With Dementia? American Journal of Alzheimer's Disease & Other Dementias. 2017;32(4):207-12.
88. Sherer M. Interactions with friends in a nursing home and residents' morale. Activities, Adaptation & Aging. 2001;26(1):23-40.
89. Freeman S, Spirgiene L, Martin-Khan M, Hirdes JP. Relationship between restraint use, engagement in social activity, and decline in cognitive status among residents newly admitted to long-term care facilities. Geriatrics & gerontology international. 2017;17(2):246-55.
90. Yukari Y, Denkinger MD, Onder G, Henrard J-C, van der Roest HG, Finne-Soveri H, et al. Dual Sensory Impairment and Cognitive Decline: The Results From the Shelter Study. Journals of Gerontology Series A: Biological Sciences & Medical Sciences. 2016;71(1):117-23.
91. Foebel A, Ballokova A, Wellens NI, Fialova D, Milisen K, Liperoti R, et al. A retrospective, longitudinal study of factors associated with new antipsychotic medication use among recently admitted long-term care residents. BMC Geriatrics. 2015;15:128.
92. Hjaltadottir I, Hallberg IR, Ekwall AK, Nyberg P. Predicting mortality of residents at admission to nursing home: a longitudinal cohort study. BMC Health Services Research. 2011;11:86.
93. Azaiza F, Ron P, Shoham M, Gigini I. Death and dying anxiety among elderly Arab Muslims in Israel. Death Studies. 2010;34(4):351-64.
94. Mullins LC, Lopez MA. Death anxiety among nursing home residents: a comparison of the young-old and the old-old. Death Education. 1982;6(1):75-86.
95. Zhang D, Yang Y, Sun Y, Wu M, Xie H, Wang K, et al. Characteristics of the Chinese rural elderly living in nursing homes who have suicidal ideation: A multiple regression model. Geriatric Nursing. 2017;38(5):423-30.
96. Zhang D, Yang Y, Wu M, Zhao X, Sun Y, Xie H, et al. The moderating effect of social support on the relationship between physical health and suicidal thoughts among Chinese rural elderly: A nursing home sample. International Journal of Mental Health Nursing. 2018;27(5):1371-82.
97. Ejaz FK, Schur D, Noelker LS. The effect of activity involvement and social relationships on boredom among nursing home residents... presented at the 42nd Annual Meeting of the American Society on Aging, Anaheim, CA 1996. Activities, Adaptation & Aging. 1997;21(4):53-66.
98. Slama CA, Bergman-Evans B. A troubling triangle. An exploration of loneliness, helplessness, and boredom of residents of a veterans home. Journal of Psychosocial Nursing & Mental Health Services. 2000;38(12):36-43.
99. Palese A, Simeoni A, Zuttion AR, Ferrario B, Ponta S, Ambrosi E. Daily crying prevalence and associated factors in older adult persons living in nursing homes: findings from a regional study. International Journal of Geriatric Psychiatry. 2018;33(1):e85-e93.
100. Andrew MK. Social capital, health, and care home residence among older adults: a secondary analysis of the Health Survey for England 2000. European Journal of Ageing. 2005;2(2):137-48.

101. Almenkerk S, Depla MFIA, Smalbrugge M, Eefsting JA, Hertogh CMPM. Pain among institutionalized stroke patients and its relation to emotional distress and social engagement. International Journal of Geriatric Psychiatry. 2015;30(10):1023-31.
102. Klapwijk MS, Caljouw MAA, Pieper MJC, Van Der Steen JT, Achterberg WP. Characteristics associated with quality of life in long-term care residents with dementia: A cross-sectional study. Dementia and Geriatric Cognitive Disorders. 2016;42(3-4):186-97.
103. Lai CK, Leung DD, Kwong EW, Lee RL. Factors associated with the quality of life of nursing home residents in Hong Kong. International Nursing Review. 2015;62(1):120-9.
104. Lood Q, Björk S, Sköldunger A, Backman A, Sjögren K, Edvardsson D. The relative impact of symptoms, resident characteristics and features of nursing homes on residents' participation in social occupations: Cross-sectional findings from U-Age Swenis. Journal of Occupational Science. 2017;24(3):327-37.
105. Tse MM, Wan VT, Vong SK. Health-related profile and quality of life among nursing home residents: Does pain matter? Pain Management Nursing. 2013;14(4):e173-e84.
106. Tse M, Leung R, Ho S. Pain and psychological well-being of older persons living in nursing homes: an exploratory study in planning patient-centred intervention. Journal of Advanced Nursing. 2012;68(2):312-21.
107. van Kooten J, van der Wouden JC, Sikkes SAM, Smalbrugge M, Hertogh CMPM, Stek ML. Pain, Neuropsychiatric Symptoms, and Quality of Life of Nursing Home Residents With Advanced Dementia in The Netherlands: A Cross-sectional Study. Alzheimer Disease & Associated Disorders. 2017;31(4):315-21.
108. Won A, Lapane KL, Vallow S, Schein J, Morris JN, Lipsitz LA, et al. Long-term effects of analgesics in a population of elderly nursing home residents with persistent nonmalignant pain. Journals of Gerontology Series A: Biological Sciences & Medical Sciences. 2006;61(2):165-9.
109. Chibnall JT, Tait RC, Harman B, Luebbert RA. Effect of acetaminophen on behavior, well-being, and psychotropic medication use in nursing home residents with moderate-to-severe dementia. Journal of the American Geriatrics Society. 2005;53(11):1921-9.
110. Husebo BS, Ballard C, Aarsland D, Selbaek G, Slettebo DD, Gulla C, et al. The Effect of a Multicomponent Intervention on Quality of Life in Residents of Nursing Homes: A Randomized Controlled Trial (COSMOS). Journal of the American Medical Directors Association. 2019;20(3):330-9.
111. Tse MM, Vong SK, Ho SS. The effectiveness of an integrated pain management program for older persons and staff in nursing homes. Archives of Gerontology & Geriatrics. 2012;54(2):e203-12.
112. Tse MM, Ho SS. Pain management for older persons living in nursing homes: a pilot study. Pain Management Nursing. 2013;14(2):e10-21.
113. Tse MMY, Yeung SSY, Lee PH, Ng SSM. Effects of a peer-led pain management program for nursing home residents with chronic pain: A pilot study. Pain Medicine (United States). 2016;17(9):1648-57.
114. Achterberg W, Pot AM, Kerkstra A, Ooms M, Muller M, Ribbe M. The effect of depression on social engagement in newly admitted Dutch nursing home residents. Gerontologist. 2003;43(2):213-8.
115. Bliss D, Harms S, Eberly LE, Savik K, Gurvich O, Mueller C, et al. Social Engagement After Nursing Home Admission: Racial and Ethnic Disparities and Risk Factors. Journal of Applied Gerontology. 2017;36(11):1306-26.
116. Branco KJ. Religious activities, strength from faith, and social functioning among African American and White nursing home residents. Journal of Religion, Spirituality & Aging. 2007;19(4):3-20.
117. Guthrie DM, Davidson JG, Williams N, Campos J, Hunter K, Mick P, et al. Combined impairments in vision, hearing and cognition are associated with greater levels of functional and communication difficulties than cognitive impairment alone: Analysis of interRAI data for home care and long-term care recipients in Ontario. PLoS ONE Vol 13(2), 2018, ArtID e0192971. 2018;13(2).
118. Kang H. Correlates of social engagement in nursing home residents with dementia. Asian Nursing Research. 2012;6(2):75-81.
119. Li Y, Cai X. Racial and ethnic disparities in social engagement among US nursing home residents. Medical Care. 2014;52(4):314-21.

120. Resnick HE, Fries BE. Windows to their world: The effect of sensory impairments on social engagement and activity time. Journals of Gerontology: Series B: Psychological Sciences and Social Sciences.52B(3):S135.
121. Resnick HE, Fries BE, Verbrugge LM. Windows to their world: The effect of sensory impairments on social engagement and activity time in nursing home residents. Journals of Gerontology - Series B Psychological Sciences and Social Sciences. 1997;52(3):S135-S44.
122. Owsley C, McGwin G, Jr., Scilley K, Meek GC, Seker D, Dyer A. Impact of cataract surgery on health-related quality of life in nursing home residents. British Journal of Ophthalmology. 2007;91(10):1359-63.
123. Owsley C, McGwin Jr G, Scilley K, Meek GC, Seker D, Dyer A. Effect of refractive error correction on health-related quality of life and depression in older nursing home residents. Archives of Ophthalmology. 2007;125(11):1471-7.
124. Garms-Homolovà V, Flick U, Röhnsch G. Sleep disorders and activities in long term care facilities -- a vicious cycle? Journal of Health Psychology. 2010;15(5):744-54.
125. Alessi CA, Martin JL, Webber AP, Kim EC, Harker JO, Josephson KR. Randomized, controlled trial of a nonpharmacological intervention to improve abnormal sleep/wake patterns in nursing home residents. Journal of the American Geriatrics Society. 2005;53(5):803-10.
126. Fritsch T, Jung K, Grant S, Lang J, Montgomery RR, Basting AD. Impact of TimeSlips, a Creative Expression Intervention Program, on Nursing Home Residents With Dementia and their Caregivers. Gerontologist. 2009;49(1):117-27.
127. Weiss W, Schafer DE, Berghom FJ. Art for institutionalized elderly. Art Therapy. 1989;6(1):10-7.
128. Boersma P, van Weert JCM, Lissenberg-Witte BI, van Meijel B, Droes RM. Testing the Implementation of the Veder Contact Method: A Theatre-Based Communication method in Dementia Care. Gerontologist. 2018;08:08.
129. Van Dijk AM, Van Weert JCM, Droes RM. Does theatre improve the quality of life of people with dementia? International Psychogeriatrics. 2012;24(3):367-81.
130. Vitorino LM, Girardi Paskulin LM, Carneiro Vianna LA. Quality of life among older adults resident in long-stay care facilities. Revista Latino-Americana de Enfermagem. 2012;20(6):1186-95.
131. Wójcik A, Nowak A, Polak M, Gleb K, Wnuk A, Szczygieï A. Physiotherapy and quality of life of patients in long-term care. Rehabilitacja Medyczna. 2017;21(2):19-24.
132. Castilho-Weinert LV, Sibele Yoko Mattozo T, Bittencourt Guimãraes AT, Gonçalves AM, Zanini LM, Cavalcanti Al, et al. Functional Performance and Quality of Life in Institutionalized Elderly Individuals. Topics in Geriatric Rehabilitation. 2014;30(4):270-5.
133. Barthalos I, Dorgo S, Kopkane Plachy J, Szakaly Z, Ihasz F, Raczne Nemeth T, et al. Randomized controlled resistance training based physical activity trial for central European nursing home residing older adults. Journal of Sports Medicine & Physical Fitness. 2016;56(10):1249-57.
134. Tse MMY, Tang SK, Wan VTC, Vong SKS. The effectiveness of physical exercise training in pain, mobility, and psychological well-being of older persons living in nursing homes. Pain Management Nursing. 2014;15(4):778-88.
135. Koenig HG, Weiner DK, Peterson BL, Meador KG, Keefe FJ. Religious coping in the nursing home: a biopsychosocial model. International Journal of Psychiatry in Medicine. 1997;27(4):365-76.
136. Brown VM, Allen AC, Dwozan M, Mercer I, Warren K. Indoor gardening older adults: effects on socialization, activities of daily living, and loneliness. Journal of Gerontological Nursing. 2004;30(10):34-42.
137. Chu HY, Chen MF, Tsai CC, Chan HS, Wu TL. Efficacy of a horticultural activity program for reducing depression and loneliness in older residents of nursing homes in Taiwan. Geriatric Nursing. 2019;18:18.
138. Lai CKY, Kwan RYC, Lo SKL, Fung CYY, Lau JKH, Tse MMY. Effects of Horticulture on Frail and Prefrail Nursing Home Residents: A Randomized Controlled Trial. Journal of the American Medical Directors Association. 2018;19(8):696-702.
139. Tse MM. Therapeutic effects of an indoor gardening programme for older people living in nursing homes. Journal of Clinical Nursing. 2010;19(7-8):949-58.

140. Calvert MM. Human-pet interaction and loneliness: a test of concepts from Roy's adaptation model. Nursing Science Quarterly. 1989;2(4):194-202.
141. Banks MR, Banks WA. The effects of animal-assisted therapy on loneliness in an elderly population in long-term care facilities. Journals of Gerontology - Series A Biological Sciences and Medical Sciences. 2002;57(7):M428-M32.
142. Sollami A, Gianferrari E, Alfieri M, Artioli G, Taffurelli C. Pet therapy: an effective strategy to care for the elderly? An experimental study in a nursing home. Acta Bio-Medica de l Ateneo Parmense. 2017;88(1S):25-31.
143. Vrbanac Z, Zecevic I, Ljubic M, Belic M, Stanin D, Bottegaro NB, et al. Animal assisted therapy and perception of loneliness in geriatric nursing home residents. Collegium Antropologicum. 2013;37(3):973-6.
144. Bernstein PL, Friedmann E, Malaspina A. Animal-assisted therapy enhances resident social interaction and initiation in long-term care facilities. Anthrozoos. 2000;13(4):213-24.
145. Martindale BP. Effect of animal-assisted therapy on engagement of rural nursing home residents. American Journal of Recreation Therapy. 2008;7(4):45-53.
146. Phelps KA, Miltenberger RG, Jens T, Wadeson H. An investigation of the effects of dog visits on depression, mood, and social interaction in elderly individuals living in a nursing home. Behavioral Interventions. 2008;23(3):181-200.
147. Richeson NE. Effects of animal-assisted therapy on agitated behaviors and social interactions of older adults with dementia. American Journal of Alzheimer's Disease & Other Dementias. 2003;18(6):353-8.
148. Wesenberg S, Mueller C, Nestmann F, Holthoff-Detto V. Effects of an animal-assisted intervention on social behaviour, emotions, and behavioural and psychological symptoms in nursing home residents with dementia. Psychogeriatrics:The Official Journal of the Japanese Psychogeriatric Society. 2019;19(3):219-27.
149. Winkler A, Fairnie H, Gericevich F, Long M. The impact of a resident dog on an institution for the elderly: effects on perceptions and social interactions. Gerontologist. 1989;29(2):216-23.
150. Banks MR, Banks WA. The effects of group and individual animal-assisted therapy on loneliness in residents of long-term care facilities. Anthrozoos. 2005;18(4):396-408.
151. Wallace JE, Nadermann S. Effects of pet visitations on semiambulatory nursing home residents: problems in assessment. Journal of Applied Gerontology. 1987;6(2):183-8.
152. Neves BB, Franz RL, Munteanu C, Baecker R. Adoption and feasibility of a communication app to enhance social connectedness amongst frail institutionalized oldest old: an embedded case study. Information Communication and Society. 2018;21(11):1681-99.
153. Siniscarco MT, Love-Williams C, Burnett-Wolle S. Video conferencing: An intervention for emotional loneliness in long-term care. Activities, Adaptation & Aging. 2017;41(4):316-29.
154. Tsai H-H, Tsai Y-F. 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. 2011;13(4):e93-e.
155. Tsai H-H, Tsai Y-F, Wang H-H, Chang Y-C, Chu HH. Videoconference program enhances social support, loneliness, and depressive status of elderly nursing home residents. Aging & Mental Health. 2010;14(8):947-54.
156. Kuru Alici N, Zorba Bahceli P, Emiroglu ON. 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. 2018;13(4):e12206.
157. Tse MMY, Lo APK, Cheng TLY, Chan EKK, Chan AHY, Chung HSW. Humor therapy: Relieving chronic pain and enhancing happiness for older adults. Journal of Aging Research. 2010;2010 (no pagination)(343574).
158. Low LF, Brodaty H, Goodenough B, Spitzer P, Bell JP, Fleming R, et al. The Sydney Multisite Intervention of LaughterBosses and ElderClowns (SMILE) study: cluster randomised trial of humour therapy in nursing homes. BMJ Open. 2013;3(1):11.

159. Siverová J, Bužgová R. INFLUENCE REMINISCENCE THERAPY ON QUALITY OF LIFE PATIENTS IN THE LONG-TERM HOSPITAL. Central European Journal of Nursing & Midwifery. 2014;5(1):21-8.
160. Siverova J, Buzgova R. The effect of reminiscence therapy on quality of life, attitudes to ageing, and depressive symptoms in institutionalized elderly adults with cognitive impairment: A quasi-experimental study. International Journal of Mental Health Nursing. 2018;27(5):1430-9.
161. Serrani Azcurra DJL. A reminiscence program intervention to improve the quality of life of long-term care residents with Alzheimer's disease. A randomized controlled trial. Revista Brasileira de Psiquiatria. 2012;34(4):422-33.
162. Schafer DE, Berghorn FJ, Holmes DS, Quadagno JS. The effects of reminiscing on the perceived control and social relations of institutionalized elderly. Activities, Adaptation and Aging. 1985;8(3-4):95-110.
163. Tabourne CES. The effects of a life review program on disorientation, social interaction and self-esteem of nursing home residents. International Journal of Aging and Human Development. 1995;41(3):251-66.
164. Chiang K-J, Chu H, Chang H-J, Chung M-H, Chen C-H, Chiou H-Y, et al. The effects of reminiscence therapy on psychological well-being, depression, and loneliness among the institutionalized aged. International Journal of Geriatric Psychiatry. 2010;25(4):380-8.
165. Lai CKY, Kayser-Jones J. Randomized controlled trial of a specific reminiscence approach to promote the well-being of nursing home residents with dementia. International Psychogeriatrics. 2004;16(1):33-49.
166. Ballard C, O'Brien J, James I, Mynt P, Lana M, Potkins D, et al. Quality of life for people with dementia living in residential and nursing home care: The impact of performance on activities of daily living, behavioral and psychological symptoms, language skills, and psychotropic drugs. International Psychogeriatrics. 2001;13(1):93-106.
167. Potkins D, Myint P, Bannister C, Tadros G, Chithramohan R, Swann A, et al. Language impairment in dementia: impact on symptoms and care needs in residential homes. International Journal of Geriatric Psychiatry. 2003;18(11):1002-6.
168. Chang HT, Liu LF, Chen CK, Hwang SJ, Chen LK, Lu FH. Correlates of institutionalized senior veterans' quality of life in Taiwan. Health and Quality of Life Outcomes. 2010;8 (no pagination)(70).
169. Carreiro-Martins P, Gomes-Belo J, Papoila AL, Caires I, Palmeiro T, Gaspar-Marques J, et al. Chronic respiratory diseases and quality of life in elderly nursing home residents. Chronic Respiratory Disease. 2016;13(3):211-9.
170. Drageset J, Espehaug B, Kirkevold M. The impact of depression and sense of coherence on emotional and social loneliness among nursing home residents without cognitive impairment - a questionnaire survey. Journal of Clinical Nursing. 2012;21(7-8):965-74.
171. Honda Y, Meguro K, Meguro M, Akanuma K. Social withdrawal of persons with vascular dementia associated with disturbance of basic daily activities, apathy, and impaired social judgment. Care Management Journals. 2013;14(2):108-13.
172. Petrovsky DV, Sefcik JS, Hanlon AL, Lozano AJ, Cacchione PZ. Social Engagement, Cognition, Depression, and Comorbidity in Nursing Home Residents With Sensory Impairment. Research in Gerontological Nursing. 2019:1-10.
173. Prieto-Flores M-E, Forjaz MJ, Fernandez-Mayoralas G, Rojo-Perez F, Martinez-Martin P. Factors associated with loneliness of noninstitutionalized and institutionalized older adults. Journal of Aging and Health. 2011;23(1):177-94.
174. Cohen-Mansfield J, Werner P. Management of verbally disruptive behaviors in nursing home residents. Journals of Gerontology - Series A Biological Sciences and Medical Sciences. 1997;52(6):M369-M77.
175. Cohen-Mansfield J, Marx MS, Thein K, Dakheel-Ali M. The impact of stimuli on affect in persons with dementia. Journal of Clinical Psychiatry. 2011;72(4):480-6.
176. Cohen-Mansfield J, Marx MS, Dakheel-Ali M, Thein K. The use and utility of specific nonpharmacological interventions for behavioral symptoms in dementia: an exploratory study. American Journal of Geriatric Psychiatry. 2015;23(2):160-70.

177. Rajkumar AP, Ballard C, Fossey J, Corbett A, Woods B, Orrell M, et al. Apathy and Its Response to Antipsychotic Review and Nonpharmacological Interventions in People With Dementia Living in Nursing Homes: WHELD, a Factorial Cluster Randomized Controlled Trial. Journal of the American Medical Directors Association. 2016;17(8):741-7.
178. Casey A-NS, Low L-F, Jeon Y-H, Brodaty H. Residents perceptions of friendship and positive social networks within a nursing home. The Gerontologist. 2016;56(5):855-67.
179. Casey AS, Low LF, Jeon YH, Brodaty H. Residents' Positive and Negative Relationship Networks in a Nursing Home. Journal of Gerontological Nursing. 2016;42(11):9-13.
180. Carstensen LL, Fremouw WJ. The influence of anxiety and mental status on social isolation among the elderly in nursing homes. Behavioral Residential Treatment. 1988;3(1):63-80.
181. de Guzman AB, Maravilla KN, Maravilla VAM, Marfil JDV, Mariñas JAR, Marquez JMB. Correlates of Geriatric Loneliness in Philippine Nursing Homes: A Multiple Regression Model. Educational Gerontology. 2012;38(8):563-75.
182. Drageset J, Kirkevold M, Espehaug B. Loneliness and social support among nursing home residents without cognitive impairment: a questionnaire survey. International Journal of Nursing Studies. 2011;48(5):611-9.