



Review

Health effects of loneliness and social isolation in older adults living in congregate long term care settings: A systematic review of quantitative and qualitative evidence

Kate L. Lapane^{a,*}, Emily Lim^{a,b}, Emily McPhillips^a, Adrita Barooah^{a,b}, Yiyang Yuan^a, Catherine E. Dube^a

^a Division of Epidemiology, Department of Population and Quantitative Health Sciences, University of Massachusetts Chan Medical School, 55 Lake Avenue North, Worcester, MA, 01605, USA

^b Department of Gerontology, University of Massachusetts Boston, Boston, MA, USA



ARTICLE INFO

Keywords:

loneliness
social isolation
nursing homes
assisted living
suicidal ideation

ABSTRACT

Background: Mounting evidence of loneliness and negative health impacts has placed loneliness among the “geriatric giants” in need of intervention by the healthcare system.

Objective: To evaluate the literature regarding the health impact of loneliness among older adults living in congregate living settings (i.e., assisted living, nursing homes).

Materials and methods: Five databases were searched for quantitative and qualitative studies from January 1990 through August 2021. Methodological quality was assessed using modified criteria specific to quantitative and qualitative studies. Dual review assured the quality of the systematic review conduct.

Results: Five qualitative, 3 mixed method, 19 cross-sectional, and 4 cohort articles were eligible. Despite different tools used to measure loneliness, loneliness appeared common among older residents in congregate living situations. In most studies, loneliness was associated with depression (regardless of scale used), albeit all but one came from cross-sectional studies. Few studies noted the association between loneliness and suicidal ideation and frailty. The three cohort studies that evaluated loneliness and mortality had mixed results. Resilience and activities appeared to mediate the association between loneliness and negative health outcomes and social support appeared to moderate associations.

Conclusions: For older adults living in congregate long term care settings, loneliness is a common phenomenon, with cross-sectional studies suggesting links to depression, suicidal ideation, and frailty. Additional longitudinal studies to understand the impact of loneliness on health outcomes in older adults living in congregate settings are needed, as are rigorous evidence-based interventions to address loneliness and mitigate its harmful effects during life’s final chapter.

1. Introduction

Loneliness is a subjective emotional state that can include feelings of disconnectedness, psychological distance, isolation, or not belonging/not accepted. (Hawkey, Masi, Berry & Cacioppo, 2006) Some people do not feel lonely when alone, while others may feel lonely when surrounded by other people. The risk for loneliness among older adults living in nursing homes, assisted living, and other long-term care environments may be heightened when actual social relations fall short of what is desired. (Cacioppo, Grippo, London, Goossens & Cacioppo,

2015; Peplau & Perlman, 1982) The social environment, perceived as friendly or hostile, can also have a powerful influence on loneliness. (Cacioppo et al., 2015) A meta-analysis on loneliness in residential and nursing care homes estimated ~61% of residents may be moderately lonely and ~35% severely lonely, with great variation in estimates across the studies with respect to geographic location, eligibility criteria, and sample size. (Gardiner, Laud, Heaton & Gott, 2020) Long-term care settings serving older adults vary widely across countries (e.g., size, staffing mandates, staffing turnover, who they serve given alternatives available that may allow people to age in place longer). Notably absent

* Corresponding author at: University of Massachusetts Chan Medical School, 55 Lake Avenue North, Worcester, MA, 01605, USA.

E-mail address: Kate.lapane@umassmed.edu (K.L. Lapane).

<https://doi.org/10.1016/j.archger.2022.104728>

Received 22 April 2022; Received in revised form 3 May 2022; Accepted 9 May 2022

Available online 13 May 2022

0167-4943/© 2022 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

were studies from the United States. This review seeks to address this research gap.

Loneliness has been linked to physical and mental health in community-dwelling people. The association between loneliness and multiple health outcomes has been explored on a cellular level. Loneliness may impact the immune system promoting immune dysregulation and inflammation driven by excessive cytokine production. (Jaremka, Fagundes & Peng, 2013; Yang, McClintock, Kozloski & Li, 2013) Dementia, cognitive decline, depression, anxiety, alcoholism, aggression, impulsivity, hypertension, obesity, stroke, and heart disease have been linked to loneliness. (Cacioppo, Hughes, Waite, Hawkley & Thisted, 2006; NIA Social isolation, 2019; Shankar, Hamer, McMunn & Steptoe, 2013) Loneliness interacts with depression to diminish overall well-being (Cacioppo et al., 2006) and has been associated with impaired sleep. (Shankar, 2020) In a national sample older adults in the US, loneliness predicted functional decline. (Perissinotto, Stijacic Cenzer & Covinsky, 2012) Further, loneliness can be deadly, as it predicts suicidal ideation (Heisel, 2019) and death, (Perissinotto et al., 2012) with an estimated 26% increased risk of premature mortality. (Cacioppo & Cacioppo, 2018) The extent to which findings in community-dwelling older adults hold for those living in congregate long term care settings is unclear.

Despite the accumulating evidence of the negative health impacts attributed to loneliness and the recognition that loneliness is among the “geriatric giants” in need of intervention by the healthcare system (Freedman & Nicolle, 2020), to our knowledge, the overall impact of loneliness on health outcomes in older adults living in congregate settings across methodologically sound studies is unknown. The need for research specifically in these congregate living settings is emphasized because residents are different than community-dwelling older adults. Despite living in congregate settings, they may be at heightened risk for negative health impacts of loneliness because of their aging-related changing composition of social networks, medical complexity including mental health conditions, and the nature of the nursing home setting (e.g., staffing turnover, short staffing, etc.). Therefore, the aim of this systematic review sought to address this research gap. We conducted an in-depth review of literature on the relationship between loneliness and health related outcomes among older adults living in congregate settings. Among studies linking loneliness to health outcomes, we sought to describe the extent of loneliness among older adults living in congregate settings.

2. Methods

This study was not considered human subjects research and as such did not require approval by the University of Massachusetts Chan Medical School Institutional Review Board. We structured our systematic review to be aligned with best practices outlined in the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA). (Moher, Liberati & Tetzlaff, 2009; Shamseer et al., 2015) We considered both qualitative and quantitative studies that may increase our understanding of the association of loneliness on health outcomes in older adults living in congregate long term care settings. We searched five databases: CINAHL, Scopus, PsycINFO, MEDLINE, and Cochrane Reviews. Our search targeted articles published between January 1, 1990 and August 31, 2021. The team developed lists of key words for three domains: 1) primary determinants of interest (e.g., social connectedness/isolation, loneliness), 2) primary outcomes (e.g., mortality, cognitive decline), and 3) setting (e.g., congregate living settings for older adults such as assisted living and nursing homes). We then worked with a research librarian to develop search algorithms and databases

most relevant to these concepts. We restricted the studies to those published in English and studies on human subjects. From the broader search results, this study focused on sub-set of studies which evaluated the association between loneliness and health outcomes. We focused this review on older adults living in communal situations such as nursing homes, residential care homes, and assisted living. An author (CED) searched PROSPERO (Anon, 2021) and Cochrane reviews to confirm that no systematic review had been conducted focusing on people living in these settings.

2.1. Search algorithms

There were three domains that were combined to form the search algorithms: (1) *setting*- congregate living setting for older adults (i.e., nursing homes, assisted living); (2) *determinants*- factors associated with positive social interactions (e.g., friendship, social engagement, social interactions) OR factors associated with absence of social interactions (e.g., loneliness, social isolation), and (3) *outcomes* – health outcomes germane to older adults (e.g., quality of life, cognitive decline, mortality). The Appendix provides the search strategy applied.

2.2. Review process

There were 3 phases of the review process: 1) review of titles; 2) review of abstracts; 3) review of full text. For each, two reviewers independently evaluated each potential article for inclusion. For the first phase, all studies that included the key terms for the primary determinants in the title were retained if the title also included terms for the setting (see Appendix). If either reviewer indicated that the title might suggest an eligible article, the article proceeded to the abstract review phase. Then, two reviewers read abstracts for potentially eligible articles (KLL and one other reviewer SK, EM, AB, or EL). Each independently made a recommendation for the article to proceed (or not) for full text review. A senior investigator (KLL) then compared the results for each abstract. If discordance was observed between the two reviewers, the abstract was re-read by KLL and a decision was made. If needed, notes on abstracts with discordance were shared with reviewers to provide more clarity. If no doubt about the eligibility remained, the article proceeded to the full text review. If the article did not have an abstract, additional information was sought out by KLL to make the eligibility determination. The full text of articles making it through the title and abstract reviews were obtained. Of the full text articles obtained relating to loneliness, we checked the references of three review articles to see if there were additional articles that may be eligible for the review. At least two authors reviewed each potential article for inclusion/exclusion. Conflicts were resolved by the team of reviewers.

2.3. Extraction and descriptive synthesis

For the quantitative studies, data were extracted by one author (KLL) and cross-validated by one of the other authors. We included cross-sectional studies relating loneliness to health outcomes regardless of whether or not the authors considered loneliness as the dependent or independent variable owing to the concurrent nature of data collection. Data from the qualitative and mixed method studies were extracted by one author (CED) and cross-validated by another (EM). Discrepancies were discussed and conflicts resolved. Shell tables were developed to highlight the relevant information about the studies in a way to enhance the transparency and understanding of the included studies. Decisions regarding the salient items to include were informed by our study question and the methods used. The information for the overall

descriptive table included: time frame of the study, setting, sample size, type of study (i.e., qualitative, mixed method, cross-sectional, cohort), and descriptive statistics (i.e., gender, age, marital status, race/ethnicity). For the quantitative studies, we extracted information regarding the scales and survey questions used to measure loneliness, the operational definitions of the health outcomes studied, covariates included in models, and if mediators/moderators were explored. We developed tables to facilitate the identification of similarities and differences in the definitions. We also summarized the main findings related to the loneliness-health outcome association under study. Because of the nature of the study, we did not extract information related to the source of study funding as we believed the topic was not likely to be influenced by the funding source. Based on the qualitative and very different quantitative studies included, we were unable to conduct a meta-analysis.

2.4. Quality assessment on included studies

We evaluated the quality of eligible studies using different tools depending on the study design. For cohort studies, we used the modified Downs and Black criteria. (Downs & Black, 1998) For cross-sectional studies, we used the Appraisal Tool for Cross-Sectional Studies (AXIS). (Downes, Brennan, Williams & Dean, 2016) By using these checklists, we were able to systematically evaluate the methodological quality of the eligible studies by examining reporting of the objectives, sample selection, external validity, and internal validity. The coding criteria included: 1) "0" if the article did not include any information addressing each issue, 2) "+" if deemed a study strength, or 3) "-" if considered a weakness. Three reviewers (EL, AB, YY) conducted individual assessment for each article, and discussed and resolved the discrepancies through team meetings.

For qualitative studies, we used the consolidated criteria for reporting qualitative research, COREQ (Tong, Sainsbury & Craig, 2007)

(modified). We evaluated the qualitative and mixed method studies according to three domains: research team and reflexivity, study design, and analysis and findings. Four items were assessed under the research team and reflexivity domain. Eleven items were evaluated under the study design domain. Articles were examined on 8 items regarding analysis and findings. Two reviewers (CED, EM) reviewed each article for the presence or absence of information and discussed discrepant rankings until consensus was achieved.

2.5. Quality assurance of systematic review

Quality control procedures were built into each phase of the study. For example, the search terms were developed with input from the team and further assistance from the research librarian. All authors participated in developing the search terms. At least two authors reviewed titles, and full text to determine eligibility. Two reviewers evaluated and confirmed the data shown on the tables. Two independent reviewers conducted the quality assessments and resolved discrepancies through a discussion until consensus was achieved.

3. Results

3.1. Search results

Fig. 1 shows that 7341 articles were identified using the search strategy described. After the title review, 6383 articles were excluded. The remaining 958 articles proceeded to abstract review. During the abstract review phase, an additional 588 articles were excluded from further consideration. Of the remaining 370 articles undergoing full text review, 296 were ineligible because these studies lacked information on loneliness. Of the remaining 74 articles, we excluded 43 articles: review articles ($n = 4$), did not include participants who were congregate care residents ($n = 1$), were intervention studies ($n = 11$), included only those

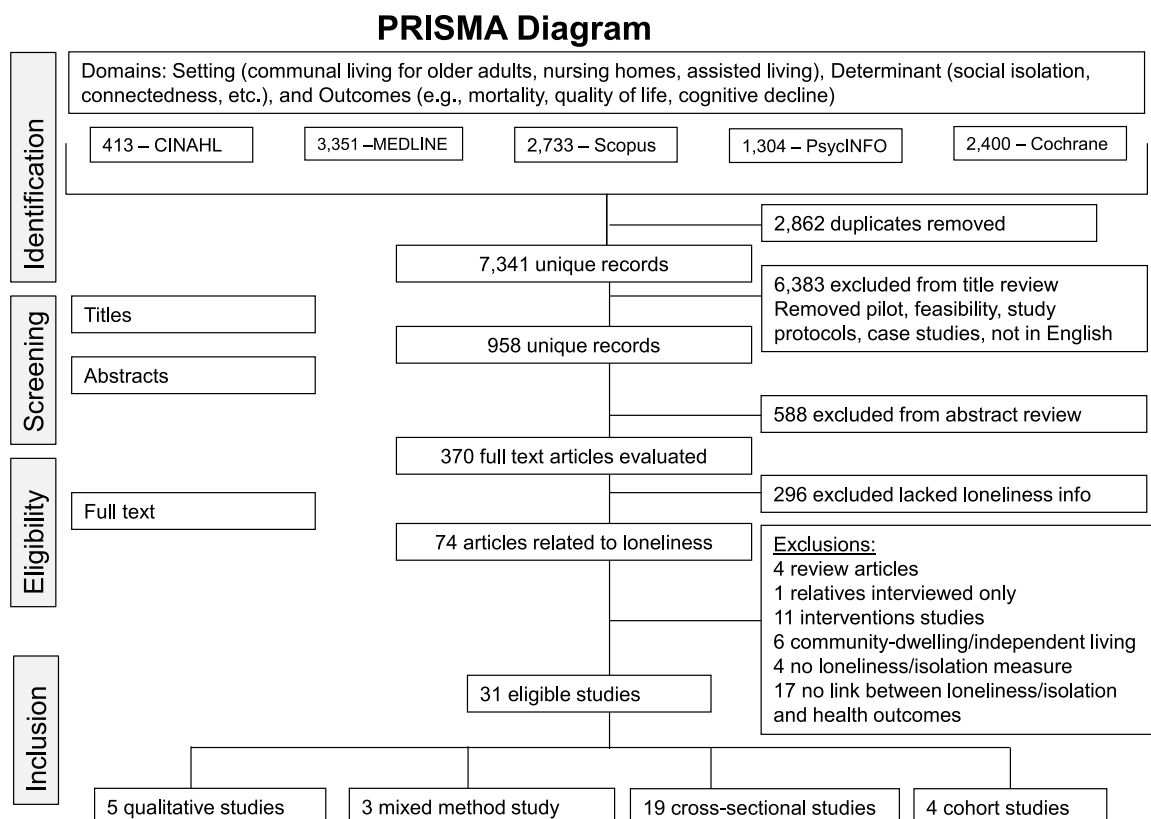


Fig. 1. PRISMA Diagram.

Table 1

Characteristics of included studies on the association between loneliness and health outcomes among older adults living in congregate long term care settings.

Author (Year) Location	Study Design / Data Source (Years of data)	# Residents and description	Sample Description% FemaleAgeMarital status% Race/Ethnicity
Cross-sectional Studies			
(Fessman and Lester, 2000)	Survey conducted in the privacy of resident's room, completed independently or questions read aloud (Year data collected not reported)	15 short term and 56 long term (30 without and 26 with Alzheimer's disease) residents with sufficient cognition living in a non-profit nursing home in a suburban area	Women: 69.0% Age ^{**} : 78.8 ± 8.4 Marital status not reported. Race/ethnicity not reported.
United States (Jongenelis et al., 2004)	Face-to-face interviews spread over 1 to 3 sessions. Sessions lasted between 1 and 3 h (1999–2001)	350 residents without severe cognitive impairment living in 14 nursing homes	Women: 68.9% Age ^{**} : 79.4 ± 8.3 Partner: 29% Widowhood: 56% Race/ethnicity not reported.
Netherlands (Eisses et al., 2004)	Face-to-face structured interviews (1999–2001)	479 residents without severe cognitive impairment, speech, or hearing difficulties living in 11 residential homes ^{***}	Women: 75.0% Age ^{**} : 85.4 ± 6.5 Married: 22.6% Widowhood: 70.1% Race/ethnicity not reported.
Netherlands (Prieto-Flores et al., 2011)	Two different surveys Interviewers supervised by researchers (2008)	234 nursing homes residents and 234 community-dwelling people aged ≥ 60 years excluding those with cognitive impairment	<u>Nursing home residents:</u> Women: 65.4% Age ^{**} : 81.1 ± 7.1 Married/partnered: 12.8%
Spain			<u>Community-dwelling:</u> Women: 58.1% Age ^{**} : 72.4 ± 8.2 Married/partnered: 57.3% Race/ethnicity not reported.
(Drageset et al., 2012)	Face-to-face interviews were conducted in participants' rooms or another appropriate place in the nursing homes (2004–2005)	227 residents who were mentally intact living in 30 nursing homes ≥ 6 months	Women: 72.6% Age ^{**} : 85.4 (range: 65–102) Married: 16.7% Widowhood: 63.4% Race/ethnicity not reported.
Norway (Tiong et al., 2013)	Face-to-face structured interviews that lasted between 15 and 30 min (2012)	375 residents able to communicate who lived in 6 different nursing homes ≥ 3 months	Women: 53.9% Age ^{**} : 77.3 ± 10.3 Married: 18.4% Widowhood: 30.9% Race/ethnicity: Chinese: 86.9% Malay/Indian/other: 13.1%
Singapore (Ahmed et al., 2014)	Structured interviews using a predetermined questionnaire (2014)	240 residents without dementia living in 4 randomly selected geriatric homes ^{**}	Women: 65.0% Age ^{**} : 64.8 ± 2.5 Married: 20.8% Widowhood: 57.9% Race/ethnicity not reported.
Egypt (Nikmat et al., 2015)	Structured questionnaires with interviews conducted in a meeting room. Interviews took ~30 min (Year data collected not reported)	110 residents without severe cognitive impairment living in 4 nursing homes	Women: 50.0% Age ^{**} : 71.6 ± 7.8 Partnered: 6.4% Widowhood: 35.5% Race/ethnicity: Malay: 69.1% Chinese: 13.6% Indian: 17.3%
West Malaysia (Tse et al., 2016)	Interviews conducted in private in a meeting or multifunctional room. Interviews took ~30 min (2013–2014)	178 residents without cognitive impairment living in 6 nursing homes	Women: 72.5% Age ^{**} : 83.9 ± 8.0 Married/partnered/ divorced/separated: 20.8% Widowhood: 58.4% Race/ethnicity not reported.
Hong Kong (Horwath and Szczerbińska, 2017)	Nurses completed a comprehensive geriatric assessment after observing the resident for 3 days (2013)	290 residents living in one long term care facility	Women: 69.0% Median age: 79 (25th, 75th percentiles: 67, 86) Married: 20.8% Widowhood: 54.1% Race/ethnicity not reported.
Poland (Zhang et al., 2017)	Interviews lasted for 1 hour and took place in the resident's room	205 residents without severe cognitive impairments who lived in 5 rural nursing homes ≥ 3 months	Women: 53.7% Age ^{**} : 77.3 ± 7.9 Married: 29.3%

(continued on next page)

Table 1 (continued)

Author (Year) Location	Study Design / Data Source (Years of data)	# Residents and description	Sample Description% FemaleAgeMarital status% Race/Ethnicity
China (Zhao et al., 2018)	(2015) Face to face interviews conducted in resident rooms	323 residents without severe cognitive impairment who lived in 25 nursing homes	Widowhood: 53.7% Race/ethnicity not reported. Women: 63.5% Age ^{**} : 78.6 ± 9.3 Married: 16.1%
China (Zhao et al., 2019)	(2017) Descriptive survey	370 residents without severe cognitive impairment who lived in 33 nursing homes ≥ 1 month	Race/ethnicity not reported. Women: 59.5% Age ^{**} : 77.6 ± 8.7 Married: 20.0%
China (Trybusińska and Saracen, 2019)	(2016) Survey completed independently or questions read aloud	250 residents with mental agility who lived in one of 7 nursing homes for ≥ 1 year	Race/ethnicity: Han: 98.1% Other: 1.9% Women: 62.8% Average age: 71 for men, 75 for women
Poland (Alarcão et al., 2019)	(2018) National study with computer-assisted personal interviewing	515 residents without severe cognitive impairment living in nursing homes	Widowhood: 4.3% for men, 16.6% for women Married: 29.3% Widowhood: 53.7% Race/ethnicity not reported.
Portugal (Jansson et al., 2020)	(2015–2016) Repeated cross-sectional study using structured questionnaires with interviews conducted on the ward by registered nurses	Residents without severe cognitive impairment living in assisted living or nursing homes (n ₂₀₁₁ =1563; n ₂₀₁₇ =1367)	Women: 70.0% Age ^{**} : 83.5 ± 0.5 Widowhood: 66.5% Race/ethnicity not reported.
Finland (Zhang et al., 2021)	(2011 and 2017) Nursing students helped participants complete the questionnaire	538 residents without severe cognitive impairment living in 37 nursing homes ≥ 1 month	Women: 73.7% Age ^{**} : 83.5 ± 8.5 Widowhood: 54.0% Race/ethnicity not reported.
China (Yang et al., 2021)	(2018–2019) Survey conducted in the privacy of resident's room	538 residents without severe cognitive impairment living in 37 nursing homes ≥ 1 month	Women 59.7% Age ^{**} : 78.1 ± 8.7 Married: 20.8% Widowhood: 70.1% Race/ethnicity not reported.
China (Zafar et al., 2021)	(2018–2019) Cross-sectional study	170 adults with mild cognitive impairment in nursing homes (n = 82) or community (n = 88)	Women: 59.7% Age ^{**} : 78.1 ± 8.7 Married: 20.8% Widowhood: 70.1% Race/ethnicity not reported.
Pakistan Cohort Studies (Cuijpers, 2001)	(Year data collected not reported) Prospective 1-year follow-up	424 residents without cognitive impairment living in 10 nursing homes (6 urban, 4 rural)	Women: 50.0% Age ^{**} : 69.8 ± 5.4 Married: 63.5% Widowhood: 8.2% Race/ethnicity not reported.
Netherlands (Drageset et al., 2013)	(Year data collected not reported) Face-to-face interview 5-year follow-up using Norwegian Causes of Death Registry	227 residents without cognitive impairment living in 30 nursing homes	Women: 78.5% Age group (years): <70: 2.1% 70–80: 23.7% 81–90: 57.8% >90: 16.4% Married: 10.6% Widowhood: 74.3% Race/ethnicity not reported.
Norway (Gan et al., 2015)	(2004/2005 followed thru 2010) Prospective 6-month follow-up Completed questionnaire package	71 residents free of depression at study onset living in one nursing home	Women: 72.2% Age group (years): 65–74: 8.8% 75–84: 34.4% 85–95: 45.8% ≥95: 11.0% Married: 16.7% Widowhood: 63.4% Race/ethnicity not reported.
China (Jansson et al., 2017)	(2014) Prospective Structured interviews at baseline 3.6 years follow-up for mortality	2072 residents without severe dementia living in 61 nursing homes and assisted living facilities	Women: 64.8% Age ^{**} : 82.5 ± 5.9 Married: 43.7% Widowhood: 50.7% Race/ethnicity not reported. Women: 75% Age ^{**} : 84±8 Married/partnered: 14.6%

(continued on next page)

Table 1 (continued)

Author (Year) Location	Study Design / Data Source (Years of data)	# Residents and description	Sample Description% FemaleAgeMarital status% Race/Ethnicity
Finland Qualitative Studies (Moyle et al., 2011)	(2011) Semi-structured, individual interviews conducted in individual's room in long term care or at the participant's home for those living in the community	60 residents with early-stage dementia living in long term care and 58 family caregivers	Widowhood: 51.8% Race/ethnicity not reported. <u>People with dementia:</u> Women: 70.2% Age range: 66–97 years Marital status not reported. <u>Family caregivers:</u> Women: 72.5% Age range: 37–89 years Marital status not reported. Race/ethnicity not reported.
Australia	(2007–2008)	10 people with early-stage dementia living in community and 15 family caregivers	Women: 66.7% Age > 80 years: 100% Marital status not reported. Race/ethnicity not reported.
(Iden et al., 2015) Norway	Semi-structured, individual interviews (2012–2013)	12 residents without dementia living in 4 nursing homes	Women: 66.7% Age > 80 years: 100% Marital status not reported. Race/ethnicity not reported.
(Österlind et al., 2017) Sweden	Repeated, individual in-depth interviews 4 interviews planned for each participant, 16 interviews completed	6 people without cognitive impairment living in one of 4 nursing homes in an urban part of Sweden for ≤ 6 months	Women: 83.3% Age range: 77–97 years Widowhood: 83.3% Race/ethnicity not reported; all were born in Sweden.
(Neves et al., 2019) Australia	(2008)* <u>Multi-method:</u> Participant observation	<u>Observation:</u> 101 h of participant observation in 2 homes over 6 months	Women: 72.7% Age**: 83.5 ± 8.0 Married: 9.0% Widowhood: 72.7% Race/ethnicity not reported.
	Semi-structured interviews (2017–2018)*	<u>Interviews:</u> 22 interviews with residents experiencing or at risk for loneliness or social isolation	
(Kaelen et al., 2021) Belgium	In-depth interviews with residents	<u>Residents:</u> 56 residents without severe cognitive impairment living in 8 nursing homes	<u>Residents:</u> Women: 62.5% Age range: 58–101 < 69: 5.4% 70–79: 28.6% 80–89: 37.5% >90: 28.6%
	Focus groups with direct care staff (2020)	<u>Staff:</u> 44 direct care staff participated in 8 focus groups (n = 3–7 each focus group)	Marital status not reported. <u>Staff:</u> Women: 86.4% No information on age. Marital status not reported. Race/ethnicity not reported for residents or staff.
Mixed Methods Studies (Ball et al., 2000)	Face-to-face structured interviews	55 residents in 17 suburban assisted living facilities 17 providers interviewed	Women: 89.0% Age: ≥ 80: 29.0% Widowhood: 84.0% 54 residents were white.
United States	Review of participating resident records Observations of the assisted living environment (Year data collected not reported)	275 records of assisted living residents 296 residents living in facilities	
(Choi et al., 2008) United States	Semi-structured in-depth interviews and survey (2006–2007)*	65 residents without cognitive impairment living in Central Texas nursing homes (2 rural, 3 urban)	Women: 76.9% Age**: 82.5 ± 8.4 Married/partnered: 13.8% Widowhood: 69.2% Race/ethnicity: African American: 3.1% Hispanic: 6.1% Other: 1.5% Non-Hispanic White: 89.2%
(Drageset et al., 2015) Norway	Face-to-face semi-structured interview and survey (2004–2005)	18 residents without cognitive impairment living in nursing homes ≥ 6 months	Women: 61.1% Age**: 84.8 ± 7.6 Married/partnered: 22.2% Widowhood: 61.1% Race/ethnicity not reported.

* Determined from lead author via email correspondence. ** Mean Age±SD (years) ***Described like assisted living homes.

Table 2

Summary of results of eligible quantitative studies on loneliness and health outcomes among older adults living in congregate long term care settings.

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Fessman and Lester, 2000) Cross-sectional	Explore the role of family and nursing home social support networks and depression and loneliness	Revised UCLA Loneliness Scale (Russell, Peplau & Cutrona, 1980)	Zung self-rated depression scale (Zung, 1965)	<u>Demographics:</u> Age, sex, time in home Close friends and visits/month Time and order of testing Who administered test (for sample with Alzheimer's disease)	The average loneliness score was 52.7 ± 7.5 among short-stay residents and 53.8 ± 5.4 among long stay residents without Alzheimer's disease, and 52.2 ± 16.1 among long stay residents with Alzheimer's disease. Loneliness was correlated with depression for short-term patients (0.73, $p < 0.001$) and long-term patients with Alzheimer's disease (0.80, $p < 0.001$), but not without Alzheimer's disease (0.26, p -value not reported). Estimates of loneliness were not provided.
(Jongenelis et al., 2004) Cross-sectional	Identify risk indicators for depression	11-Item Loneliness Scale (de Jong Gierveld & van Tilburg, 1999) with a cutoff score of 3 distinguishing between those who were lonely or not	30 Item Geriatric Depression Scale (GDS) (Yesavage et al., 1983) with subclinical depression indicated with scores ≥ 11 Minor depression Major depression	<u>For subclinical depression model:</u> Age, pain, visual impairment, stroke <u>Minor depression model:</u> No covariates <u>Major depression model:</u> Pain, visual impairment, stroke	Residents with loneliness had greater odds of sub-clinical depression (adjusted odds ratio (aOR): 3.38; 95% confidence interval (CI): 1.72 to 6.63), minor depression (odds ratio: 4.52 (95% CI: 2.06 to 9.90), and major depression (aOR: 22.32; 95% CI: 2.55 to 195.66) relative to those without loneliness.
(Eisses et al., 2004) Cross-sectional	Evaluate indicators of depressive symptoms in social and personal domains	11-Item Loneliness Scale (de Jong Gierveld & van Tilburg, 1999)	Log transformed, GDS (Yesavage et al., 1983)	<u>Demographics:</u> Age, sex, marital status, education level, religion, time in home, social support <u>Health variables:</u> Pain, blind, hearing impaired, incontinent, familial vulnerability, chronic diseases, recent hospitalization, recent visit to specialist, functional impairment, and cognitive function	The median loneliness score was 3 (range: 0–11, standard deviation: 2.7). Loneliness was associated with log transformed geriatric depression scores (adjusted $\beta = 0.37$, $p < 0.01$).
(Prieto-Flores et al., 2011) Cross-sectional	Evaluate if factors of loneliness differ between institutionalized and community-dwelling older adults	6-item Loneliness Scale (lonely: scores 2–6; not lonely: scores 0–1)	Barthel Index (Mahoney & Barthel, 1965) (Scores: 0 to 100) Hospital Anxiety and Depression Scale (HADS-D) (A. S. Zigmond & Snaith, 1983) (Scores: 0 to 20) EQ-5D and EQ VAS (EuroQol Group, 1990; Badía, Schiaffino, Alonso & Herdman, 1998)	Loss of child(ren), recent life event Age, sex, education level, marital status, having children, number of visits, EQ-5D Index, health status EQ VAS, number medical conditions.	Among those in nursing homes, 71.6% were categorized in the lonely group. Residents with higher Barthel Index were less likely to report feeling lonely (aOR: 0.98; 95% CI: 0.96–0.999) and more likely to have higher HADS-D scores (aOR: 1.24; 95% CI: 1.12–1.37).

(continued on next page)

Table 2 (continued)

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Drageset et al., 2012) Cross-sectional	Quantify the association between depressive symptoms, sense of coherence and emotional and social loneliness	Revised 16-Item Social Provisions Scale (Cutrona & Russell, 1987) with 4 subscales <u>Two loneliness subscales:</u> Emotional loneliness (attachment subscale) Social loneliness (social integration)	Short version of the GDS (Sheikh & Yesavage, 1986) with scores ≥ 5 indicating depressive symptoms	<u>Demographics:</u> Age, sex, marital status, educational level Comorbidity	The average emotional loneliness and social loneliness was high [attachment subscale: 13.3 ± 3.2 (range: 4–16), social integration subscale: 11.3 ± 3.4 (range: 4–16), respectively]. <u>Note:</u> Each loneliness subscale was the outcome variable in separate linear models. Endorsement of depressive symptoms was associated with emotional loneliness ($\beta = -0.14$, 95% CI: -0.1 to 0.0) and social loneliness ($\beta = -0.1$, 95% CI: -2.8 to -0.3). While 67.7% and 10.9% had visitors \geq once a month and \geq once a year, respectively, 3.7% had visitors $<$ once a year and 17.6% never had visitors. Residents who had no or lacked social contact had greater odds of depression than those who did not lack social contact (aOR: 2.33; 95% CI: 1.25 to 4.33).
(Tiong et al., 2013) Cross-sectional	Identify factors associated with depression	<u>Social contact:</u> Do you get visitors? How often do you get visitors- do you get visitors at least once a month, at least once a year, less than once a year, or never? <i>Exact recoding of variable is unclear.</i>	Structured Clinical Inventory (9 symptoms) with ≥ 5 symptoms endorsed (Friedman et al., 2009)	Length of stay > 2 years History of depression Pain Difficulty communicating with staff	More than half of residents reported that they had often (51.3%) and sometimes (27.1%) experienced loneliness. Relative to those who rarely experienced loneliness, those who often and sometimes felt lonely had greater odds of depression (aOR _{often} : 5.20; 95% CI: 1.96–12.90); aOR _{sometimes} : 3.79; 95% CI: 1.35–10.66). Participants experienced loneliness (FS: 8.47 ± 3.4 ; very isolated: 80.9%, isolated: 14.5%). The FS score was associated with the GDS score (Spearman's correlation: -0.48 , $p < 0.01$).
(Ahmed et al., 2014) Cross-sectional	Identify factors associated with depression and anxiety	3-item loneliness scale (Hughes, Waite, Hawkey & Cacioppo, 2004) with summed responses for each item (1-hardly ever, 2-some of the time, 3-often) categorized as: Rare (1–3) Sometimes (4–6) Often (7–9)	Short version of the GDS (Sheikh & Yesavage, 1986) with scores ≥ 5 indicating depressive symptoms	<u>Demographics:</u> Age, sex, social class Functional status Comorbidity	More than half of residents reported that they had often (51.3%) and sometimes (27.1%) experienced loneliness. Relative to those who rarely experienced loneliness, those who often and sometimes felt lonely had greater odds of depression (aOR _{often} : 5.20; 95% CI: 1.96–12.90); aOR _{sometimes} : 3.79; 95% CI: 1.35–10.66). Participants experienced loneliness (FS: 8.47 ± 3.4 ; very isolated: 80.9%, isolated: 14.5%). The FS score was associated with the GDS score (Spearman's correlation: -0.48 , $p < 0.01$).
(Nikmat et al., 2015) Cross-sectional	Determine the prevalence of loneliness and late-life depression among older adults with cognitive impairment	6-item Friendship Scale (FS) (Hawthorne, 2006) with 3 items on loneliness and 3 on importance of social contacts [total score: 0 (complete social isolation) to 24 (high social connectedness)]	Short version of the GDS (Sheikh & Yesavage, 1986) with scores ≥ 5 indicating higher depression level	Although age, sex, ethnicity, education, marital status, family support, relationship, financial status, comorbidities, medications, and cognitive impairment were assessed, these did not appear to have been used to provide adjusted measures of association.	Participants experienced loneliness (FS: 8.47 ± 3.4 ; very isolated: 80.9%, isolated: 14.5%). The FS score was associated with the GDS score (Spearman's correlation: -0.48 , $p < 0.01$).

(continued on next page)

Table 2 (continued)

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Tse et al., 2016) Cross-sectional	Investigate the association between loneliness and frailty (pain and psychological factors were explored)	20-item Chinese version of the UCLA Loneliness Scale (Chou, Jun & Chim, 2005) (score: 20 to 80)	FRAIL scale (Morley, Malmstrom & Miller, 2012) ranging from 0 to 5 (0 robust, 1–2 prefrail, 3–5 frail)	<u>Demographics:</u> Age, sex, education level, previous occupation, years in nursing home <u>Other covariates:</u> Life satisfaction, happiness, pain, timed up and go	The average loneliness score was 42.7 ± 13.6 among frail residents, 41.5 ± 11.3 among pre-frail residents, and 37.6 ± 7.8 among robust residents. After adjusting for covariates, loneliness was associated with frailty ($\beta=0.37$; $p = 0.025$). Nearly one-quarter (24.2%) reported feeling lonely. Overall, those reporting loneliness had higher odds of probable depression (aOR: 7.70; 95% CI: 3.53–16.80; aOR _{<80 years} : 12.16; 95% CI: 3.24–45.64; aOR _{80 years} : 13.53; 95% CI: 3.13–58.47).
(Horwath and Szczerbińska, 2017) Cross-sectional	Identify factors related to depression	InterRAI-Long-term Care Facilities Assessment System used, but details regarding loneliness variable not reported	7-item Depression Rating Scale (scores: 0 to 14): 0 – no indicators of depression 1–2 – some indicators of depression ≥ 3 probable depression No reference provided for Depression Rating Scale.	<u>Covariates in the entire sample model:</u> <u>Demographics:</u> Age, sex <u>Clinical:</u> Other psychiatric disorders, history of mental illness, pain, behavioral problems, psychotic symptoms, sleep disorders, dyspnea <u>Covariates in the age-stratified model:</u> Sex, cognitive impairment, activities of daily living, dyspnea, conflicts with residents/staff, history of mental illness, recent stressful life events <u>Demographics:</u> Sex, marital status Physical illness, social activity, self-esteem, children visiting frequency, depression, hopelessness	The average loneliness score was 35.2 ± 9.1 among residents with no suicide ideation and 51.4 ± 13.1 among residents with suicide ideation. The path analysis revealed that loneliness influenced suicidal ideation indirectly through depression ($\beta=0.053$) and hopelessness ($\beta=0.002$).
(Zhang et al., 2017) Cross-sectional	Identify the direct and indirect effects of factors associated with suicidal ideation	20-item Chinese version of the UCLA Loneliness Scale (Version 3) (Chou et al., 2005) (scores: 20 to 80)	Item 9 of the Beck Depression Inventory (Beck, Steer & Brown, 1996) (0: no thoughts of killing myself; 1, 2, 3: any thoughts of killing myself)	<u>Demographics:</u> Sex, marital status Physical illness, social activity, self-esteem, children visiting frequency, depression, hopelessness	The average loneliness score was 35.2 ± 9.1 among residents with no suicide ideation and 51.4 ± 13.1 among residents with suicide ideation. The path analysis revealed that loneliness influenced suicidal ideation indirectly through depression ($\beta=0.053$) and hopelessness ($\beta=0.002$).
(Zhao et al., 2018) Cross-sectional	Explore whether resilience mediates the association between loneliness and depressive symptoms	20-item Chinese version of the UCLA Loneliness Scale (Version 3) (Chou et al., 2005) (scores: 20 to 80)	7-item Hospital Depression Scale (HDS) (Mykletun, Stordal & Dahl, 2001) (scores: 0 to 21), with scores ≥ 8 indicating high levels of depressive symptoms	<u>Mediation analysis:</u> <u>Demographics:</u> Age, sex, marital status, education, self-rated financial status, administrative districts Mini-Mental Status Exam (MMSE) <u>Mediator:</u> Resilience Connor-Davidson Resilience Scale-10 item (CD-RISC-10) (Campbell-Sills and Stein, 2007) Moderated mediation analysis further included <u>moderator:</u> social support - 12-item Multidimensional Scale of Perceived Social Support (MSPSS) (Zimey, Dahlem, Zimet & Farley, 1988)	The average loneliness score was 38.6 ± 10.4. The total effect of loneliness on depressive symptoms was significant ($\beta=0.45$, $p < 0.001$). The indirect effect between loneliness and depressive symptoms through resilience was 0.17, with 95% bias-corrected bootstrap CI: 0.11 to 0.25). The indirect effect of resilience on loneliness and depressive symptoms was moderated by social support.

(continued on next page)

Table 2 (continued)

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Zhao et al., 2019) Cross-sectional	Evaluate the extent to which activity engagement mediates the relationship between loneliness and frailty	“Do you feel lonely?” (Luo and Waite, 2014) (never/seldom, versus sometimes, often/always)	FRAIL scale (Morley et al., 2012) ranging from 0 to 5 (0 robust, 1–2 prefrail, 3–5 frail)	<u>Demographics:</u> Age, sex, ethnicity, marital status, years of education <u>Clinical:</u> Self-rated health, insomnia, depression <u>Nursing home characteristics:</u> Ownership, affiliation, fitness site, outdoor activity place, occupancy, staff-resident ratio, staff turnover, single-room percentage <u>Mediator:</u> Activity engagement	More than one in four residents reported that they experienced loneliness (27.6%). The direct effect of loneliness on frailty was 0.08 (95% CI: -0.03 to 0.19). The indirect mediation effect of loneliness on frailty through activity engagement was 0.04 (95% CI (bootstrap): 0.01 to 0.07); 31% of the total effect of loneliness on frailty was explained by the mediated effect through activity engagement.
(Trybusińska and Saracen, 2019) Cross-sectional	Explore the association between loneliness and quality of life	11-Item Loneliness Scale (De Jong-Gierveld & Kamphuis, 1985)	WHOQOL-BREF Questionnaire Basic Hope Scale (BHI-12) Satisfaction with Life Scale (SWLS) Acceptance of Illness Scale (AIS) No references were provided.	Estimates do not appear to be adjusted for any covariates.	Nearly four in ten residents reported feeling lonely (moderate: 17.2%, high: 22.4%; overall scale: 30.8 ± 7.2). Residents with greater loneliness scored lower on the BHI-12 (-0.29, $p < 0.0001$), SWLS (-0.36, $p < 0.0001$), and AIS (-0.34, $p < 0.0001$) scales, and WHOQOL-BREF (weak or moderate correlations not reported).
(Alarcão et al., 2019) Cross-sectional	Explore gender-related differences in psychosocial determinants of self-perceived health	16-item UCLA Loneliness Scale, Scores 16 to 64, with scores > 32 indicative of loneliness	Single item for self-perception of general health status (DeSalvo, Fan, McDonell & Fihn, 2005) (Excellent/Good versus Fair/Poor/Very Poor)	<u>Demographics:</u> Age, sex, marital status, education, time in the nursing home, financial well-being Functional status Symptoms of depression	Forty-three percent of residents reported feeling lonely (women: 44.9%; men: 39.0%). Loneliness was associated with poor self-rated health in women (aOR 2.86, 95% CI: 1.05–7.78), but not men (aOR 0.50, 95% CI: 0.08–3.00).
(Jansson et al., 2020) Repeated cross-sectional	Examine changes in the prevalence of loneliness over time from 2011 to 2017	Do you suffer from loneliness (never/sometimes/often or always)?	Feeling depressed No details regarding this measure or references provided.	<u>Demographics:</u> Age, sex, living in a nursing home, widowhood, education <u>Clinical:</u> needing assistance in personal care, dementia, cancer, number of medications	The proportion of residents experiencing loneliness was 37% in 2011 and 36% in 2017. Feeling depressed was associated with loneliness (aOR: 4.10; 95% CI: 3.43–4.89).
(Yang et al., 2021) Cross-sectional	Evaluate the mediating role of depression on the relationship between loneliness and suicidal ideation and the extent to which the association between loneliness, depressive symptoms, and suicidal ideation is moderated through resilience	20-item UCLA Loneliness Scale (Chou et al., 2005) (scores: 20 to 80)	19-item Beck Suicide Ideation Scale (Li et al., 2017) (BSI-CV) (scores: 0 to 38)	<u>Demographics:</u> Age, sex, marital status, education, self-rated financial status, frequency of children visits, number of diseases, and MMSE <u>Mediator:</u> Hospital Depression Scale (HDS) and a sub-scale of Hospital Anxiety and Depression (HAD) <u>Moderator:</u> Connor-Davidson Resilience Scale-10 item (CD-RISC-10) (Hughes et al., 2004)	Nearly one third (32.7%) reported severe loneliness (41.0 ± 11.4). The total effect of loneliness on suicide ideation was 0.46 (direct effect: 0.31, indirect effect through depression: 0.16). Resilience moderated the direct effect of loneliness on suicidal ideation ($\beta = -0.109$, 95% CI: -0.18 to -0.04), as well as indirect paths.

(continued on next page)

Table 2 (continued)

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Zafar et al., 2021) Cross-sectional	Evaluate the mediating effect of loneliness on the association between depression and quality of life in those with mild cognitive impairment	20-item UCLA Loneliness Scale (Russell, Peplau & Ferguson, 1978) (scores 20 to 80), with scores 20–34 low, 35–49 moderate, and 50–80 high degree of loneliness	Mild Cognitive Impairment Questionnaire (MCQ) (Dean, Jenkinson, Wilcock & Walker, 2014), with higher scores indicating poorer quality of life in those with mild cognitive impairments.	<u>Note:</u> Depression was a primary determinant 14-item depression subscale of the Depression Anxiety Stress Scale (DASS-42) (Lovibond & Lovibond, 1995), Scores 0–9 normal, 10–13 mild, 14–20 moderate, 21–27 severe, and ≥ 28 extremely severe levels of depression <u>Mediator:</u> 20-item UCLA Loneliness Scale ⁹⁸	Most experienced at least moderate levels of loneliness (71.8% moderate, 13.5% moderately high; loneliness score: 43.5 ± 7.8). Depression was associated with loneliness ($\beta=0.29$, 95% CI: 0.05 to 0.52). The association between loneliness and quality of life (MCQ) was not statistically significant ($\beta=0.16$, 95% CI: -0.01 to 0.33). Loneliness partially mediated the association between depression and MCQ but did not mediate the association between MCQ on depression. Overall, 13.2% had a low risk, 4.1% had a moderate risk, and 7.2% had a high risk of suicide. The direct effect of loneliness on suicidal ideation was 0.26 (95% CI: 0.17 to 0.35). The indirect mediation effect of loneliness on suicidal ideation through resilience was 0.07 (95% CI: 0.01 to 0.12); resilience partially mediated the effect of loneliness on suicidal ideation. Support from family moderated the direct path (loneliness to suicidal ideation), but not the indirect paths (through resilience). Support from nursing staff only moderated the resilience to the suicidal ideation path. Further, while the direct effect of loneliness on suicidal ideation was highest among those with low family support, the indirect effect was highest in those with low levels of nursing staff.
(Zhang et al., 2021) Cross-sectional	Evaluate the mediating effect of resilience on the association between loneliness and suicidal ideation and whether this mediating effect was moderated by social support	20-item UCLA Loneliness Scale (Version 3) (Chou et al., 2005) (scores: 20 to 80)	Beck Scale for Suicidal Ideation-Chinese Version Current (BSI-CV-C) (Wang, Jiang, Cheung, Sun & Chan, 2015), with scores 1–8 low risk, 9–16 moderate risk, and ≥ 17 high risk of suicide	<u>Demographics:</u> Age, sex, marital status, education background, duration of residence, monthly income, self-rated financial status <u>Health-related:</u> Self-rated health, depressive symptoms <u>Mediator:</u> Connor-Davidson Resilience Scale-10 item (CD-RISC-10) ⁹² <u>Moderators:</u> Multidimensional Scale of Perceived Social Support (MSPSS) (Zimet, Dahlem, Zimet & Farley, 1988), 12 items, 3 subscales: Family, friends, significant others (nursing staff in this context)	The direct effect of loneliness on suicidal ideation was 0.26 (95% CI: 0.17 to 0.35). The indirect mediation effect of loneliness on suicidal ideation through resilience was 0.07 (95% CI: 0.01 to 0.12); resilience partially mediated the effect of loneliness on suicidal ideation. Support from family moderated the direct path (loneliness to suicidal ideation), but not the indirect paths (through resilience). Support from nursing staff only moderated the resilience to the suicidal ideation path. Further, while the direct effect of loneliness on suicidal ideation was highest among those with low family support, the indirect effect was highest in those with low levels of nursing staff.
(Cuijpers, 2001) Cohort	Examine the association between depressive symptoms and mortality Investigate loneliness and mortality among cognitively intact residents	12-Item* Loneliness Scale (Morley et al., 2012) Revised 16-Item Social Provisions Scale (Zung, 1965) with 4 subscales	Death within 1 year Date of death from Norwegian Causes of Death	<u>Demographics:</u> Age, sex, years living in a residential home <u>Chronic illness:</u> Lung, cardiac, peripheral arteriosclerosis, diabetes mellitus, stroke, rheumatoid arthritis, cancer <u>Other variables:</u> pain, activities of daily living, social support, depression, mental health, intervention status <u>Demographics:</u> Age, education	Loneliness was not associated with risk of mortality in 1 year (aOR: 1.06; 95% CI: 0.94 to 1.19). Overall, 21.3% with a high level of emotional loneliness (attachment (continued on next page)

Table 2 (continued)

Author (Year) Study Design	Study Objective	Loneliness	Main Outcome(s)	Covariates	Main findings
(Drageset et al., 2013) Cohort		<p><u>Two loneliness subscales:</u> Emotional loneliness (subscale attachment)</p> <p>Social loneliness (subscale social integration)</p>	Registry (during the 5-year follow-up period)	<u>Chronic illness:</u> Comorbidity index	<p>scores 0–12) died during the 5-year follow-up period relative to 11.1% with a low level of emotional loneliness (attachment scores: 13–16).</p> <p>The adjusted hazard ratio for the continuous attachment scale (ranging from 4 to 16) was 0.96 (95% CI: 0.91 to 0.99). Cancer did not appear to be included in the final model.</p>
(Gan et al., 2015) Cohort	Determine the relationship between loneliness, rumination, and depression	UCLA-8 Item Loneliness Scale (Hays & DiMatteo, 1987)	Center for Epidemiologic Studies Depression 20 Item Scale (CES-D) (Radloff, 1977)	<p><u>Mediator:</u> Rumination Responses Scale 10-Item short version (RSS) (Treyner et al., 2003)</p> <p>Illness history</p>	<p>There was a direct effect of loneliness on depression ($\beta=0.05$; 95% CI: 0.01 to 0.42); rumination did not mediate the association.</p>
(Jansson et al., 2017) Cohort	Quantify the association between loneliness and mortality	Do you suffer from loneliness (seldom or never/sometimes/often or always)?	Mortality from central registers on April 15, 2015	Age and Charlson comorbidity index	<p>Loneliness was common at baseline (sometimes 25.8%; often or always 9.0%).</p> <p>The risk for mortality was higher among the “sometimes lonely” (HR 1.19; 95% CI 1.05–1.35) and the “always lonely” group (HR 1.28; 95% CI 1.06–1.55) relative to the “not lonely” residents.</p>

* Note: Manuscript states 12-items, but original paper indicates this is an 11-item scale.

who were community-dwelling or living independently ($n = 6$), were quantitative studies lacking a measure of loneliness or social isolation ($n = 4$), or did not attempt to link loneliness or social isolation to a health outcome ($n = 17$). Of the remaining 31 eligible studies, five were qualitative studies, (Iden, Ruths & Hjørleifsson, 2015; Kaelen et al., 2021; Moyle, Kellett, Ballantyne & Gracia, 2011; Neves, Sanders & Kokanović, 2019; Österlind, Ternestedt, Hansebo & Hellström, 2017) three were mixed method studies, (Ball et al., 2000; Choi et al., 2008; Drageset, Dysvik, Espehaug, Natvig & Furnes, 2015) 19 were cross-sectional studies, (Ahmed, El Shair, Taher & Zyada, 2014; Alarcão et al., 2019; Drageset, Espehaug & Kirkevold, 2012; Eisses et al., 2004; Fessman & Lester, 2000; Horwath & Szczerbińska, 2017; Jansson, Savikko, Kautiainen, Raitto & Pitkälä, 2020; Jongenelis et al., 2004; Nikmat, Hashim, Omar & Razalli, 2015; Prieto-Flores, Forjaz, Fernandez-Mayoralas, Rojo-Perez & Martinez-Martin, 2011; Tiong, Yap, Huat Koh, Phoon Fong & Luo, 2013; Trybusińska & Saracen, 2019; Tse, Lai, Lui, Kwong & Yeung, 2016; Yang, Wang, Zhang, Zhao & Su, 2021; Zafar et al., 2021; Zhang et al., 2017, 2021; Zhao et al., 2018; Zhao, Gao, Li & Wang, 2019) and four were cohort studies. (Cuijpers, 2001; Drageset, Eide, Kirkevold & Ranhoff, 2013; Gan, Xie, Duan, Deng & Yu, 2015; Jansson et al., 2017)

3.2. Characteristics of studies

The key characteristics of studies examining the association between loneliness or social isolation on health outcomes are shown in Table 1. Studies come from across the globe and are organized by study design, and by year within each study design. Three eligible studies were conducted in the United States, 12 studies were performed in the Asia-Pacific region, 14 studies were conducted in Europe, and 1 was from Egypt.

Of the five qualitative studies, three used semi-structured interviews, (Iden et al., 2015; Moyle et al., 2011; Österlind et al., 2017) one augmented semi-structured interviews with participant observation, (Neves et al., 2019) and one augmented resident interviews with focus groups with direct care staff. (Kaelen et al., 2021) The smallest study had 6 participants (Österlind et al., 2017) and the largest 60 participants. (Moyle et al., 2011) Only two qualitative studies reported marital status (widowhood: > 70%). (Neves et al., 2019; Österlind et al., 2017) The three mixed method studies enhanced the qualitative data collected from in-depth interviews with survey data (Choi et al., 2008; Drageset et al., 2015) or record review and observations. (Ball et al., 2000)

For quantitative studies, 19 cross-sectional studies and four cohort studies were eligible. A repeated cross-sectional study had 1563 participants in 2011 and 1367 participants in 2017. (Jansson et al., 2020)

Table 3
Summary of results of eligible qualitative and mixed methods studies on loneliness among older adults living in congregate long term care settings.

Author (Year) Study Design	Study Objective	Methods	Main findings	
			Causes and contributors of loneliness	Ways to reduce loneliness
(Moyle et al., 2011) Qualitative	Explore the perception of loneliness according to people with early-stage dementia living in community and long-term care and the views of their family caregivers	Thematic analysis	Dementia symptoms impact the ability to socially engage resulting in loneliness which is intensified when others lack understanding of dementia. Loneliness can develop when there are social and emotional deficits.	Meaningful relationships are important in reducing feelings of loneliness, as well as staying occupied and keeping busy. Activities help residents cope with loneliness.
(Iden et al., 2015) Qualitative	Explore nursing home residents' perceptions of sadness focusing on the phenomenon of sadness rather than the medical diagnosis of depression	Systematic text condensation (Malterud, 2012)	The informants perceived their sadness to be caused by loss of health and functional ability, reliance on long-term care, dysfunctional technical aids and poor care. Loss of family and friends, and lack of conversations with staff members and fellow patients were sources of sadness.	Loneliness across the spectrum of care services needs to be addressed. Sadness was addressed through acceptance/re-orientation to their current life situation, maintaining narratives about their identity and belonging, and religiosity.
(Österlind et al., 2017) Qualitative	Deepen understanding of how older persons living in a nursing home experience life close to death	Interpretive approach (Dahlberg, Dahlberg & Nystrom, 2008)	Life in a nursing home involves living with a feeling of loneliness in an unfamiliar place both from a social and an existential perspective. Loss of independence and inability to live on their own caused sorrow. Participants knew their future time was short and death was inescapable, to be expected, and the natural end to a long life.	Having staff nearby for help was calming. Conversation and socializing daily can promote feelings of meaningfulness. Conversations about dying/ death are needed.
(Neves et al., 2019) Qualitative	Explore how older people (aged 65+) living in care homes experience, articulate, and respond to social isolation and loneliness	Thematic analysis (Fereday & Muir-Cochrane, 2006; Braun & Clarke, 2006; King & Horrocks, 2010)	Participants understood loneliness and social isolation as relational and associated with oldering (age-related contexts, norms, status), personal troubles, and sickness. They situated loneliness and social isolation as multidimensional phenomena: related to both structural (e.g., oldering) and agentic (e.g., personal choices) dimensions.	Most felt it was their own responsibility to address loneliness and employed individual and social strategies to cope with and regulate disclosure of loneliness and isolation. Positive coping strategies from loneliness and isolation include staff engagement, residents who acted as social 'bridges,' and human touch and presence.
(Kaelen et al., 2021) Qualitative	Understand psychosocial and mental health needs of nursing home residents in times of Covid-19 and how staff can respond accordingly	Thematic content analysis (Green & Thorogood, 2004)	Residents experienced losses of freedom, social life, autonomy, and recreational activities that deprived them of basic psychological needs and had a massive impact on their mental well-being. Staff witnessed the detrimental effects of the measures imposed on residents. The abrupt stop to any social and physical contact with either staff or other residents created a widespread feeling of solitude and loneliness.	Staff were confronted with professional and ethical dilemmas, feeling 'trapped' between infection prevention and control and the residents' wellbeing. Five major needs of resident during containment were social contact, freedom, activities, communication, and autonomy.
(Ball et al., 2000)	Explore what assisted living residents deem most important to their day-to-day life and to identify		Quality of life domains included aspects related to quality of care and components of quality of life such as independence and	Psychological well-being, autonomy and independence, social relationships, and

(continued on next page)

Table 3 (continued)

Author (Year) Study Design	Study Objective	Methods	Main findings	
			Causes and contributors of loneliness	Ways to reduce loneliness
Mixed Methods	the domains of quality of life that are most meaningful to residents.	Grounded theory (Strauss and Corbin, 1990) Self-reported loneliness, depression, anxiety	autonomy, social relationships, and meaningful ways to spend time. Most domains related to the facility's social and physical environment, and most were influenced by the structure and process of the care provided.	meaningful activities were linked to the quality of care. Domains such as safety/security, religion, physical environment, and food were noted. Individualized approaches to care and goodness of fit between a person's unique needs and the ability of a facility to meet them are keys to care quality. Self-reported coping mechanisms included religion and stoicism, a sense of reality, positive attitude, and family support.
(Choi et al., 2008) Mixed Methods	Examined residents' understanding and perceptions of depressive symptoms, causes of their depression, their self-reported coping strategies, and their preferences for acceptable depression interventions.	Theme-based content analysis 15-item Geriatric Depression Scale (de Jong Gierveld & van Tilburg, 1999); Select data from most recent MDS assessment	Residents noted that causes of depression were loss of independence, freedom and continuity with their past life; feelings of social isolation and loneliness; lack of privacy and frustration at the inconvenience of having a roommate and sharing a bathroom; loss of autonomy due to the institutional regimen and regulations; ambivalence toward cognitively impaired residents; ever-present death and grief; staff turnover and shortage; and stale programming and lack of meaningful in-house activities. Suffering is prominent and anxiety and depression predict worse mental health.	Residents preferred programs to reduce their isolation over psychotherapy.
(Drageset et al., 2015) Mixed Methods	Investigate suffering and mental health among cognitively intact nursing home residents	Mixed-methods design with concurrent components (Morse & Niehaus, 2009) and content analysis (Graneheim & Lundman, 2004; Kvale & Brinkmann, 2009) SF-36 subscales (Ware & Sherbourne, 1992); Hospital Anxiety and Depression Scale (A. S. Zigmond & Snaith, 1983); Social Provisions Scale (Zung, 1965)	Descriptions of the life situation in nursing provided detailed information about several psychosocial aspects and experienced suffering.	Social relationships are important for mental health and, conversely, lack of social relationships is a source of suffering. Emotional closeness and relationships with people who share concerns and interests is important. Improvements in care among the residents to reflect their concerns aimed at alleviating suffering are possible. To improve the situation of residents, more attention should be paid to the residents' suffering related to anxiety, depression, and relationships.

All but one (Fessman & Lester, 2000) cross-sectional study reported marital status. Of those reporting, all but three (Nikmat et al., 2015; Tiong et al., 2013; Trybusińska & Saracen, 2019) reported that more than half reported widowhood. The four cohort studies respectively had 6-months, (Gan et al., 2015) 1 year, (Cuijpers, 2001) 3.6 years, (Jansson et al., 2017) and 5-years (Drageset et al., 2013) of follow-up. The smallest cohort study had 71 participants (Drageset et al., 2013) and the largest had 2072 participants. (Jansson et al., 2017) Across all studies, the majority of participants were women (Range: 50.0% (Zafar et al., 2021) to 89.0% (Ball et al., 2000)), and the majority reported widowhood.

3.3. Summary of quantitative studies

Table 2 shows a summary of the 23 quantitative studies. With respect to loneliness, nine studies used some variant of the UCLA Loneliness scale, (Alarcão et al., 2019; Fessman & Lester, 2000; Gan et al., 2015; Tse et al., 2016; Yang et al., 2021; Zafar et al., 2021; Zhang et al., 2017, 2021; Zhao et al., 2018) four used the 11-item Loneliness scale, (Cuijpers, 2001; Eisses et al., 2004; Jongenelis et al., 2004; Trybusińska & Saracen, 2019) one used a 6-item Loneliness scale, (Prieto-Flores et al., 2011) two used the Social Provisions Scale, (Drageset et al., 2012, 2013) one used the Friendship Scale, (Nikmat et al., 2015) and the remaining used either a single question, information on social contact, or an unspecified question. Regardless of the loneliness measures used, the majority of studies that included metrics to describe the extent of loneliness in the sample showed that the phenomenon was common in congregate long term care settings.

While the specific outcomes of interest differed across the included cross-sectional studies, the most common outcome variables were depression, suicidal ideation, and frailty. A variety of scales were used for the studies that focused on depression as the outcome variable. These included the Geriatric Depression Scale (GDS), (Ahmed et al., 2014; Drageset et al., 2012; Eisses et al., 2004; Jongenelis et al., 2004; Nikmat et al., 2015) structured clinical inventory for DSM (SCID), (Tiong et al., 2013) Hospital Depression Scale (HDS), (Zhao et al., 2018) Center for Epidemiologic Studies Depression (CES-D), (Gan et al., 2015) and the Zung self-rated depression scale. (Fessman & Lester, 2000) In all but one study that examined the association between loneliness and depression, estimates indicated a link between loneliness and depression. Only one group of participants in one study (Fessman & Lester, 2000) reported that loneliness was correlated with depression for short-term patients and long-term patients with Alzheimer's disease, but not for long-term patients without Alzheimer's disease. Only one cohort study evaluated depression as an outcome (Gan et al., 2015) and a direct effect of loneliness on depression was reported ($\beta=0.05$; 95% CI: 0.01 to 0.42). Three studies examined suicidal ideation with two studies that used the Chinese version of the Beck Suicide Ideation Scale (Yang et al., 2021; Zhang et al., 2021) and one study that used item nine from the Beck Depression Inventory. (Zhang et al., 2017) These studies supported the association between loneliness and suicidal ideation, with two studies showing that loneliness influenced suicidal ideation indirectly through depression. In the two studies that used the FRAIL scale (Tse et al., 2016; Zhao et al., 2019) to measure frailty as an outcome variable, there was an association between loneliness and frailty, although in one study the confidence interval was wide and included no association. Three cohort studies evaluated death as an outcome with inconsistent findings. In one study, (Cuijpers, 2001) loneliness was not associated with the risk of 1-year mortality, whereas two studies (Drageset et al., 2013; Jansson et al., 2017) showed that loneliness was associated with mortality.

3.4. Summary of qualitative and mixed method studies

The results from the extracted findings from the qualitative and mixed method studies are shown in Table 3. A variety of methods were used in the eight studies, with thematic analysis most common. Common themes across the qualitative and mixed method studies emerged. With respect to contributors of loneliness in older adults living in congregate settings, findings across the studies noted similar issues: poor health (including dementia symptoms), loss of independence and autonomy, lack of privacy, loss of friends, and lack of social interactions. Common themes emerging from the studies relating to ways in which the residents ameliorated loneliness included acceptance of current life situation, activities, fostering meaningful relationships, having staff to help, family support, and religiosity.

3.5. Quality reporting and bias assessment

Table 4 shows the results of the evaluation of the quality of reporting of the qualitative studies. With respect to research team and reflexivity, of the eight studies, five reported who conducted the interviews, (Choi et al., 2008; Drageset et al., 2015; Iden et al., 2015; Neves et al., 2019; Österlind et al., 2017) two mentioned the researchers' credentials and their occupation at the time of the study, (Choi et al., 2008; Drageset et al., 2015) and none mentioned the characteristics of the interviewers. Regarding study design reporting, all mentioned what methodological orientation underpinned the study, all provided the number of participants and important characteristics of the sample, none of the studies mentioned if other people were present during the interviews, and none discussed data saturation. All but one study (Österlind et al., 2017) described how study participants were selected and five studies (Choi et al., 2008; Drageset et al., 2015; Iden et al., 2015; Kaelen et al., 2021; Neves et al., 2019) provided details regarding how the participants were approached. Two studies (Choi et al., 2008; Kaelen et al., 2021) provided the number of participants who refused and the reasons for refusals. Four studies mentioned where the data were collected (Drageset et al., 2015; Kaelen et al., 2021; Moyle et al., 2011; Österlind et al., 2017) and five studies mentioned the duration of the interviews. (Choi et al., 2008; Drageset et al., 2015; Iden et al., 2015; Kaelen et al., 2021; Moyle et al., 2011) Three studies provided questions used in the interviews. (Kaelen et al., 2021; Moyle et al., 2011; Österlind et al., 2017) All but two studies (Moyle et al., 2011; Österlind et al., 2017) included information on the number of coders used. Two studies provided information on the coding tree. (Drageset et al., 2015; Kaelen et al., 2021) Two studies included information regarding the software used. (Ball et al., 2000; Choi et al., 2008) All studies clearly presented major findings, included quotations to illustrate themes, and demonstrated consistency between the findings and the data provided.

Tables 5 and 6 show the results of the evaluation of quality of cross-sectional and cohort studies respectively. With respect to the cross-sectional studies, all but one study (Trybusińska & Saracen, 2019) reported the study objectives, although for many estimating the association between loneliness and adverse health outcomes was not the primary focus of the paper. All but two studies (Fessman & Lester, 2000; Trybusińska & Saracen, 2019) clearly described the study sample. Ten of the 18 studies did not report response rates; more than half lacked further consideration of the impact of non-response on the study findings. The majority provided clear operational definitions of loneliness and the health outcomes under study and most discussed the validity, reliability, or accuracy of the measures used. None provided distributions of potential confounders by the levels of loneliness in the sample. The majority described their analytic strategy, the main study findings,

Table 4
Qualitative and Mixed Methods Studies: Modified COREQ (Consolidated criteria for REporting Qualitative research) Checklist (Tong et al., 2007) Items Included.

Authors, Year	Research Team & Reflexivity				Study Design					
	Which author(s) conducted the interview?	What were the researcher's credentials?	What was their occupation at the time of the study?	What characteristics were reported about the interviewer?	What methodological orientation was stated to underpin the study?	How were the participants selected?	How were the participants approached?	How many participants were in the study?	How many people refused to participate? Reasons?	Where was the data collected?
Moyle et al., 2011	✓	✓	✓	-	✓	✓	-	✓	-	✓
Iden et al., 2015	✓	-	-	-	✓	✓	✓	✓	-	-
Österlind et al., 2017	✓	✓	-	-	✓	✓	✓	✓	-	✓
Neves et al., 2019	✓	-	-	-	✓	✓	✓	✓	-	-
Kaelen et al., 2021	-	-	-	-	✓	✓	✓	✓	✓	✓
Ball et al., 2000	-	-	-	-	✓	✓	-	✓	-	-
Choi et al., 2008	✓	✓	✓	-	✓	✓	✓	✓	✓	-
Drageset et al., 2015	✓	✓	✓	-	✓	✓	✓	✓	-	✓

✓ Present - Absent.

included estimates of precision and or p-values, and discussed the study limitations. Most studies considered and adjusted for potential confounders. All but one study (Fessman & Lester, 2000) reported funding sources, conflicts of interest, and ethics approval. With respect to the three included cohort studies, all clearly stated their study objectives, described the sample, described operational definitions of loneliness and outcomes of interest, but none provided distributions of potential confounders by levels of loneliness. None provided power analyses or sample size calculations. The three studies clearly described their analytic approach, main findings (including p-values and/or 95% confidence intervals), and limitations. One study (Cuijpers, 2001) lacked information on funding, conflicts of interest, or ethics approval and quality reviewers agreed that the statistical methodology applied did not adjust for differential lengths of follow-up.

4. Discussion

This systematic review confirmed that loneliness was common among older adults living in congregate long term care living settings. We found that loneliness was associated with negative health outcomes including depression, suicidal ideation, and frailty for older adults in congregate living settings. While it is plausible for loneliness to cause depression (and this is supported by the qualitative and mixed method studies included in our review), the studies synthesized in this systematic review do not rule out the possibility of a bi-directional association as most used cross-sectional designs. Only three studies (Cuijpers, 2001; Drageset et al., 2013; Jansson et al., 2017) evaluated the impact of loneliness on mortality and findings were mixed. Suggestions on how to reduce loneliness in congregate long term care living settings for older adults included efforts by residents themselves as well as the facilities (e.

g., staff engagement, organized social activities).

Regardless of the study location, design, or measures used to assess loneliness, our study found that most older adults living in congregate settings experienced at least some degree of loneliness. The findings from our review were consistent with estimates from a recent meta-analysis which estimated the prevalence of loneliness in residential and nursing care homes. (Gardiner et al., 2020) In both the meta-analysis and our synthesis of quantitative and qualitative studies, loneliness among older adults living in congregate long term care settings was common. Loneliness among community-dwelling older adults ranges from 19% to 29%. (Ong, Uchino & Wethington, 2016) Whether older adults entering nursing homes are already lonely while living in the community, or whether loneliness onset occurred concurrent or after admission to nursing homes is unknown. A recent study attributed nearly 20% of nursing home admissions to loneliness and noted that this modifiable risk factor for nursing home admission may be a target of intervention to delay time to admission. (Hanratty, Stow, Collingridge Moore, Valtorta & Matthews, 2018) Among older adults living in rural areas of the US, people with high baseline loneliness scores were more likely to be admitted to a nursing home than those with lower loneliness scores. (Russell, Cutrona, de la Mora & Wallace, 1997) Losing self-determination due to institutionalization was strongly related to loneliness. (Paque, Bastiaens, Van Bogaert & Dilles, 2018)

We also found that loneliness was associated with mental health (e.g., depression, suicidal ideation) and physical health (e.g., frailty), albeit most studies were cross-sectional in nature. Among the cross-sectional studies, several studies reporting odds ratios showed large measures of association (odds ratios >2), (Ahmed et al., 2014; Alarcão et al., 2019; Horwath & Szczerbińska, 2017; Jansson et al., 2020; Jongenelis et al., 2004; Tiong et al., 2013) whereas those reporting continuous measures

Study Design			Analysis & Findings							
What methodological orientation was stated to underpin the study?	Was anyone else present besides the participants and researchers?	What are the important characteristics of the sample?	How many data coders coded the data?	Did authors provide a description of the coding tree?	Were themes identified in advance or derived from the data?	What software was used to manage the data?	Did participants provide feedback on the findings?	Were participant quotations presented to illustrate the themes/findings?	Was there consistency between the data presented and the findings?	Were major themes clearly presented in the findings?
✓	-	✓	✓	-	✓	-	-	✓	✓	✓
✓	-	✓	✓	-	✓	-	-	✓	✓	✓
✓	-	✓	-	-	✓	-	-	✓	✓	✓
✓	-	✓	✓	-	✓	-	-	✓	✓	✓
✓	-	✓	✓	✓	✓	-	-	✓	✓	✓
✓	-	✓	✓	-	✓	✓	-	✓	✓	✓
✓	-	✓	✓	-	✓	✓	-	✓	✓	✓
✓	-	✓	✓	✓	✓	-	-	✓	✓	✓

of association showed modest, but statistically significant measures of association with unclear clinical relevance. One cohort study found a direct effect of loneliness on depression (Gan et al., 2015), but the effect size was small (loneliness $\beta=0.05$; 95% CI: 0.01 to 0.42). With respect to mortality as the outcome of interest, study findings were mixed. No association was found in one study (Cuijpers, 2001), a small effect size was noted for the association between attachment and mortality (attachment HR: 0.95; 95% CI 0.91–0.99) (Drageset et al., 2013), and another found a gradient between frequency of loneliness and mortality (sometimes lonely HR 1.19, 95% CI 1.05–1.35; always lonely HR 1.28, 95% CI 1.06–1.55). (Jansson et al., 2017) Social connectedness, the relationship people have with others, (Poey, Burr & Roberts, 2017) contributes to thriving in nursing homes. (Abbott, 2021bib1; Bergland & Kirkevold, 2008) Lack of social connectedness leads to isolation (Cotterell, Buffel & Phillipson, 2018; Zavaleta, Samuel & Mills, 2020) and loneliness, (O'Rourke, Collins & Sidani, 2018) proposed as the new “geriatric giants” (Friedman et al., 2009) in need of intervention by the health care system.(<https://doi.org/10.17226/25663> 2020)

While not explicitly a goal of the review, the synthesis of qualitative findings revealed insights about potential approaches to mitigating loneliness. Two targets for interventions emerged: 1) the residents themselves; and 2) the facilities. The synthesis of the qualitative and mixed method studies noted that residents did recognize their own agency in experiencing loneliness. Interventions to help residents through their transition to congregate living settings such as assisted living or nursing homes to prevent loneliness are needed. One such program, the Program to Enhance Adjustment to Residential Living (PEARL), (Davison et al., 2020) a simple, brief program based on self-determination theory, has been shown to reduce symptoms of depression in newly admitted residents. (Davison et al., 2021) A recent

systematic review to evaluate the extent to which video calls could help reduce loneliness in older people was inconclusive and called for more studies focusing on older adults and using rigorous methods. (Noone et al., 2020) A meta-analysis attempting to quantify the impact of interventions specifically targeting loneliness (albeit in many different settings and populations) showed mixed results of interventions in nursing homes including group activities, (Fokkema & van Tilburg, 2007; Winningham & Pike, 2007) animal assisted therapy, (Banks & Banks, 2002; Banks, Willoughby & Banks, 2008; Jessen, Cardiello & Baun, 1996) access to computers, (Shapira, Barak & Gal, 2007; White et al., 1999, 2002) and reminiscence therapy. (Chiang et al., 2010) While many activity-based interventions have been published, a synthesis of evidence-based interventions to address loneliness for older adults in nursing homes and assisted living is lacking. (Masi, Chen, Hawkey & Cacioppo, 2011) In response to the unprecedented COVID-19 pandemic, congregated long term care living facilities around the world attempted and/or implemented innovative intervention strategies to alleviate loneliness in residents. An in-depth synthesis of the types and effectiveness of these interventions in congregate long term care settings through systematic review and meta-analysis is warranted. Given the different needs of older adults living in assisted living and nursing homes and innovations that may have been implemented in response to the COVID-19 pandemic, a systematic review and meta-analysis singularly focusing on older adults in congregate living settings is warranted.

4.1. Research implications

This systematic review identified two research gaps. First, only three eligible studies were conducted in the United States, with 11 studies

Table 5
Quality ratings of cross-sectional studies using a modified AXIS criteria (Downes et al., 2016).

Item	Fessman & Lester, 2000	Jongenelis et al., 2004	Eisses et al., 2004	Prieto-Flores et al., 2011	Drageset et al., 2012	Tiong et al., 2013	Ahmed et al., 2014	Nikmat et al., 2015	Tse et al., 2016	Horwath & Szczerbińska, 2017	Zhang et al., 2017	Zhao et al., 2018	Zhao et al., 2019	Trybusińska & Saracen, 2019	Alarcão et al., 2019	Jansson et al., 2020	Zhang et al., 2021	Yang et al., 2021	Zafar et al., 2021	
Quality of reporting																				
Is the hypothesis/aim/objective of the study clearly described?	+	+	+	+	+	+	+	+	+	+	+	+	+	0	+	+	+	+	+	+
Are the characteristics of the people included in the study clearly described?	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+
Has the response rate been reported? ¹	0	0	+	0	+	+	0	+	0	0	+	+	0	0	+	0	+	0	0	0
Are the operational definitions of the exposure variables of interest clearly described?	-	+	+	+	+	+	+	+	+	-	+	+	+	-	+	-	+	+	+	+
Are the operational definitions of the health outcomes clearly described in the methods section?	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	+	+
Are the distributions of potential confounders provided by level of exposure variable?	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Is the analytic approach clearly described?	0	+	+	+	+	+	+	+	+	-	+	+	+	-	+	-	+	+	+	+
Are the main findings of the study clearly described?	-	+	+	+	+	+	-	+	+	-	+	+	+	-	+	-	+	+	+	+
Have 95% confidence intervals or actual p-values for the primary effect measures (loneliness-health outcome associations) been reported?	-	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+
Were the authors' discussions and conclusions justified by the results?	-	+	-	+	+	+	+	+	+	-	+	+	+	-	+	-	+	+	+	-
Were the limitations of the study discussed?	-	+	+	+	+	+	-	+	+	+	+	+	+	0	+	+	+	+	+	-
Validity																				
Was estimating the association between loneliness and health outcome(s) the primary objective of the study? ²	+	-	-	-	+	*	-	-	-	-	-	+	+	-	-	+	+	+	+	+
Was the study design appropriate for the stated aim(s)?	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+	+	+

(continued on next page)

Table 5 (continued)

Item	Fessman & Lester, 2000	Jongenelis et al., 2004	Eisses et al., 2004	Prieto-Flores et al., 2011	Drageset et al., 2012	Tiong et al., 2013	Ahmed et al., 2014	Nikmat et al., 2015	Tse et al., 2016	Horwath & Szczerbińska, 2017	Zhang et al., 2017	Zhao et al., 2018	Zhao et al., 2019	Trybusińska & Saracen, 2019	Alarcão et al., 2019	Jansson et al., 2020	Zhang et al., 2021	Yang et al., 2021	Zafar et al., 2021
Was the sample size justified? ³	0	0	0	0	+	0	+	0	+	0	0	0	0	0	0	0	0	0	0
Was the target/reference population clearly defined?	0	-	+	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+	-
Was the sample frame representative of the target population under investigation?	0	-	+	-	+	-	+	-	-	-	-	-	-	-	+	-	-	-	-
Was the selection process likely to select participants that were representative of the target population under investigation?	0	-	+	-	+	-	+	-	-	-	-	-	-	-	+	-	-	-	-
Were measures undertaken to address and describe non-responders? ⁴	0	+	-	-	+	0	0	+	0	0	+	0	0	0	+	0	0	0	0
Does the response rate raise concerns about non-response bias?	0	0	+	0	+	+	0	+	0	0	+	+	0	0	+	0	+	0	0
Was non-response differential by level of loneliness? ⁵	0	*	*	0	0	*	*	*	*	*	*	0	0	*	*	0	0	0	0
Was the loneliness measure(s) used accurate (valid and reliable)? ⁶ (Measurement/misclassification)	-	+	+	+	+	*	+	-	+	-	+	+	+	-	+	-	+	+	+
Were the main outcome measures used accurate (valid and reliable)? ⁶ (Measurement/misclassification)	-	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	+	+	+
Were the most likely confounders measured? (Measurement/misclassification)	-	+	+	+	+	+	+	+	+	-	+	+	+	-	+	+	+	+	0
Were the statistical tests used to evaluate the association between loneliness and health outcome(s) appropriate?	-	+	+	+	+	+	+	-	+	+	+	+	+	-	+	+	+	+	+
Were confounders appropriately handled in the design or analysis phases of the study? (Confounding)	-	+	+	+	+	+	+	-	+	+	+	+	+	-	+	+	+	-	*

(continued on next page)

Table 5 (continued)

Item	Fessman & Lester, 2000	Jongenelis et al., 2004	Eisses et al., 2004	Prieto-Flores et al., 2011	Drageset et al., 2012	Tiong et al., 2013	Ahmed et al., 2014	Nikmat et al., 2015	Tse et al., 2016	Horwath & Szczecińska, 2017	Zhang et al., 2017	Zhao et al., 2018	Zhao et al., 2019	Trybusińska & Saracen, 2019	Alarcão et al., 2019	Jansson et al., 2020	Zhang et al., 2021	Yang et al., 2021	Zafar et al., 2021
Were the results internally consistent?	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Other																			
Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Was ethical approval or consent of participants attained?	0	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

+/- Reported and how performed was a strength (+) or weakness (-) 0 Not reported *= Not applicable (N/A).

Notes.

¹Articles must report their response rates in percentage to be rated as "+".

²Articles are rated "+" only if they use loneliness as the main exposure variable of interest, not as confounds or as risk factors.

³Articles are rated "+" if power analysis was conducted.

⁴Articles are rated "+" only if they provide descriptions about the non-responders.

⁵Articles are rated "+" only if their study aims were about loneliness and other health outcomes and non-response is differentiated by level of loneliness. They will be rated "0" if their study aims were about loneliness but did not differentiate non-responses by level of loneliness. Articles are rated "*" if their study aims were not about loneliness at all.

⁶Articles were rated "-" if they simply stated the name of instruments used to measure loneliness or the main outcomes and provided no information about their reliability or validity.

Table 6
Quality ratings of cohort studies using modified Downs and Black criteria (Downs & Black, 1998).

Quality of Reporting	Cuijpers, 2001	Drageset et al., 2013	Gan et al., 2015	Jansson et al., 2017
Is the hypothesis/aim/objective of the study clearly described?	+	+	+	+
Are the characteristics of the people included in the study clearly described?	+	+	+	+
Have the characteristics of participants lost to follow-up been described?	+	0	0	+
Are the operational definitions of the exposure variables of interest clearly described?	+	+	+	+
Are the operational definitions of the health outcomes clearly described in the methods section?	+	+	+	+
Are the distributions of potential confounders provided by level of exposure variable?	0	0	0	+
Is the analytic approach clearly described?	+	+	+	+
Are the main findings of the study clearly described?	+	+	+	+
Have 95% confidence intervals or actual p-values for the primary effect measures (loneliness-health outcome associations) been reported?	+	+	+	+
Were the authors' discussions and conclusions justified by the results?	+	+	-	+
Were the limitations of the study discussed?	+	+	+	+
External validity				
Were the participants in the study representative of the entire population from which they were recruited?	-	+	-	-
Internal validity - bias				
Was estimating the association between loneliness and health outcome(s) the primary objective of the study? ¹	-	+	+	+
Were the participants recruited from the same population regardless of level of loneliness? (Selection bias)	+	+	+	+
Were participants recruited over the same period of time regardless of level of loneliness? (Selection bias)	+	+	+	+
Was the loneliness measure(s) used accurate (valid and reliable)? (Measurement/misclassification)	-	+	+	-
Were the main outcome measures used accurate (valid and reliable)? (Measurement/misclassification)	-	+	+	+
Were the most likely confounders measured? (Measurement/misclassification)	+	+	-	-
Were the statistical tests used to evaluate the association between loneliness and health outcome(s) appropriate?	-	+	+	+
Do the analyses adjust for different lengths of follow-up of participants? (Selection)	-	+	*	+
Were confounders appropriately handled in the design or analysis phases of the study? (Confounding)	+	-	-	+
Were the results internally consistent?	+	-	+	+
Were the methods (including statistical methods) sufficiently described to enable them to be repeated?	+	+	+	+
Power*				
Did the study have sufficient power to detect a clinically important effect where the probability value for a difference being due to chance is less than 5%? Sample sizes have been calculated to detect a difference of x% and y%.	0	0	0	0
Other				
Were there any funding sources or conflicts of interest that may affect the authors' interpretation of the results?	0	+	+	0
Was ethical approval or consent of participants attained?	0	+	+	+

Notes.

¹ Articles are rated "+" only if they use loneliness as the main exposure variable of interest, not as confounders or as risk factors.

+/- Reported and how performed was a strength (+) or weakness (-) 0 Not reported * = Not applicable (N/A).

conducted in the Asia-Pacific region. Given the cultural and societal differences in how older adults are viewed (Sokolovsky, 2009) and differences with respect to what long term care living spaces are and when older adults enter them (Ribbe, Ljunggren & Steel, 1997), we question the extent to which findings from other parts of the world may be generalizable to older adults living in congregate settings in North America. We speculate that the reasons for the paucity of studies in North America may be related to lack of funding for research on this topic. Recent initiatives by the National Institutes of Health are likely to stimulate research in this space. (Anon 2022) Second, our systematic review revealed that longitudinal studies quantifying the association between loneliness and health outcomes for older adults living in nursing homes or assisted living are scant. Given the high prevalence of loneliness in these settings, that residents live in nursing homes is on average 2 years, (Jones, Dwyer & Bercovitz, 2009) and the mounting evidence from cross-sectional studies suggesting the contribution of loneliness to many adverse health outcomes, there is a pressing need for rigorous longitudinal studies to not only quantify the association between loneliness and health outcomes, but also to identify factors that may mediate the negative impact of loneliness on health.

4.2. Strengths and limitations

Our systematic review has many strengths. We used PRISMA guidelines (Moher et al., 2009; Shamseer et al., 2015) to conduct this review. Working with a research librarian, we developed a list of key words associated with our domains of interest to cast a wide net in hopes that we would not miss articles related to loneliness or social isolation. Further, terminology used to identify congregate living settings for older

adults was broad as terms vary across countries (e.g., care homes, residential care, skilled nursing facilities, nursing homes). Our comprehensive approach including searching five databases. We also applied dual review processes and dual evaluation of the quality and bias potential of included studies to bolster the rigor of our review. Despite these efforts, it is possible that relevant articles were missed. We were unable to conduct a meta-analysis given the heterogeneity of measures and statistical approaches used in the eligible articles.

5. Conclusions

Loneliness among older adults is a common phenomenon in congregate long term care living settings. Loneliness appears to be associated with depression, suicidal ideation, frailty, but the directionality of the associations remains unclear because most of the studies linking loneliness to health outcomes were cross-sectional. Longitudinal studies to understand the impact of loneliness on health outcomes in older adults in congregate long term care settings are needed, as are rigorous qualitative studies and research on evidence-based interventions to prevent loneliness, reduce loneliness, and mitigate the harmful effects of loneliness during life's final chapter.

Author contributions

Dr. Lapane obtained funding for the research.

Dr. Lapane and Dube conceptualized this manuscript.

Dr. Dube and Ms. Lim worked with the research librarian. Ms. Lim led the execution of the search.

All authors participated in the identification of articles, review of the

titles, abstracts, and full text.

Dr. Dube, Dr. Yuan, Ms. Barooah, Ms. Lim, and Ms. McPhillips conducted the quality and bias assessments.

Drs. Lapane and Dube drafted the article.

All authors contributed to the revision and editing of the manuscript.

Funding: The work was funded by a grant to Dr. Lapane from the National Institutes of Health (R01AG071692).

Declaration of Competing Interest

None of the authors have any conflicts of interest.

Acknowledgments

We acknowledge the assistance of Becky Baltich Nelson, research librarian at the University of Massachusetts Chan Medical School.

Appendix

Search strategy

Databases and limits

We searched the following five databases with limits shown in parentheses and number of records: CINAHL (limited to Jan 1990 – August 2021, English language, Peer-reviewed, Human; $n = 416$), Scopus (limited to 1990 – 2021, English, Humans; $n = 2733$), Cochrane Library (limited to Cochrane reviews only, Jan 1990 – August 2021; $n = 2400$), MEDLINE Complete = 3351 (limited to 1990–2021, English, Humans; $n = 3351$), and PsycINFO (limited to 1990–2021, English, Humans, Peer-reviewed journals; $n = 1304$).

Search algorithms

The search algorithms combine three domains: Setting, Determinant, and Outcomes

The syntax for CINAHL as shown:

Setting: (Assisted Living Facilities [MH] OR (assisted adj3 living) OR (MH "Housing for the Elderly") OR Homes for the Aged [MH] OR (((home* adj3 aged) or (old adj3 age adj3 home*) or (housing adj3 elderly) or (retirement adj3 (home* or center* or center*))) OR (MH "Long Term Care") OR (long adj3 term adj3 care) OR

(MH "Nursing Homes+") OR (((nursing adj3 home*) or (intermediate adj3 care adj3 facility*) or (skilled adj3 nursing adj3 facility*) or (extended adj3 (care or nursing) adj3 facilit*)) OR (MH "Rehabilitation Centers") OR ((rehab* adj3 (center* or center*) or (inpatient adj3 rehabilitation))) OR (MH "Residential Facilities") OR (residential adj3 facilit*) OR

(MH "Subacute Care") OR (((subacute or sub-acute or postacute or post-acute) adj3 care)))

AND

Determinant: (Friends [MH] OR (friend* or companion* or acquaintance*) OR Group Structure [MH] OR (((group adj3 structure*) or (informal adj3 network*) or (network adj3 composition*))) OR (MH "Interpersonal Relations") OR (((interpersonal or social*) adj3 relation*) OR (MH "Patient Isolation") OR (patient adj3 (exclu* or isolat* or seclu*)) OR (MH "Peer Group") OR (peer adj3 (group* or relation*)) OR (MH "Recreational Therapy") OR (MH "Recreation Therapy (Iowa NIC)") OR (recreation* adj3 therap*) OR (MH "Social Inclusion") OR (social* adj3 inclu*) OR

(MH "Social Isolation") OR (MH "Social Isolation (Saba CCC)") OR (MH "Social Isolation (NANDA)") OR

((MH "Social Isolation") OR (MH "Social Isolation (Saba CCC)") OR (MH "Social Isolation (NANDA)")) OR ((social* adj3 (alienat* or breakdown* or depriv* or exclu* or isolat* or ostraci* or lonel*)) OR (MH "Social Participation") OR (social* adj3 (activit* or citizenship or engag* or participat*)) OR (MH "Social Skills") OR (((interpersonal or social*) adj3 (ability* or competenc* or skill*))) OR (MH "Social Support

(Iowa NOC)") OR ((social* adj3 (care or connect* or support*) or (psycosocial adj3 support*)))

AND

Outcomes: (MH "Anhedonia") OR (MH "Anxiety") OR (MH "Anxiety (Saba CCC)") OR (MH "Behavioral Symptoms") OR

(MH "Cognitive Therapy") OR (((cognitive or mental) adj3 (dysfunction* or impair* or declin* or deteriorat*)) or (neurocognitive adj3 disorder*)) OR (MH "Confusion (Saba CCC)") OR (MH "Confusion") OR (MH "Death") OR

Frailty [MH] OR (frail* or debilit*) OR (MH "Functional Status") OR (functional adj3 (declin* or dependence* or status*)) OR (MH "Hospitalization") OR Illness Behavior [MH] OR (((illness or sickness) adj3 behavior*)) OR

(Lethargy [MH] OR lethargy) OR (MH "Mental Health") OR (((mental or psychological) adj3 (health or well-being or wellbeing))) OR ((MH "Morbidity") OR morbidit) OR (MH "Mortality") OR (Patient Readmission [MH] OR readmission*) OR (MH "Quality of Life") OR (MH "Quality of Life") OR (((quality adj3 life) or HRQOL or (life adj3 satisfaction))) OR

("Sleep Initiation and Maintenance Disorders" [MH]) OR ((sleep adj3 (disorder* or dysfunction*) or DIMS or (early adj3 awakening) or insomnia* or sleeplessness))

The syntax for MEDLINE and PsycINFO as shown:

Setting: ((Assisted Living Facilities/ or (assisted adj3 living).ti,ab.) OR (Homes for the Aged/ or Housing for the Elderly/ or ((home* adj3 aged) or (old adj3 age adj3 home*) or (housing adj3 elderly) or (retirement adj3 (home* or center* or center*))).ti,ab.) OR (Long-Term Care/ or (long adj3 term adj3 care).ti,ab.) OR (exp Nursing Homes/ or (nursing adj3 home*) or (intermediate adj3 care adj3 facility*) or (skilled adj3 nursing adj3 facility*) or (extended adj3 (care or nursing) adj3 facilit*).ti,ab.) OR (Rehabilitation Centers/ or (rehab* adj3 (center* or center*) or (inpatient adj3 rehabilitation)).ti,ab.) OR (Residential Facilities/ or (residential adj3 facilit*).ti,ab.) OR (Subacute Care/ or ((subacute or sub-acute or postacute or post-acute) adj3 care).ti,ab.)

AND

Determinant: ((Friends/ or (friend* or companion* or acquaintance*).ti,ab.) OR (Group Structure/ or ((group adj3 structure*) or (informal adj3 network*) or (network adj3 composition*))).ti,ab.) OR (Interpersonal Relations/ or ((interpersonal or social*) adj3 relation*).ti,ab.) OR (Patient Isolation/ or (patient adj3 (exclu* or isolat* or seclu*).ti,ab.) OR (Peer Group/ or (peer adj3 (group* or relation*))).ti,ab.) OR (Recreation Therapy/ or (recreation* adj3 therap*).ti,ab.) OR (Social Inclusion/ or (social* adj3 inclu*).ti,ab.) OR (Social Isolation/ or (social* adj3 (alienat* or breakdown* or depriv* or exclu* or isolat*) or ostraci* or lonel*).ti,ab.) OR (Social Participation/ or (social* adj3 (activit* or citizenship or engag* or participat*).ti,ab.) OR (Social Skills/ or ((interpersonal or social*) adj3 (ability* or competenc* or skill*).ti,ab.) OR (exp Social Support/ or (social* adj3 (care or connect* or support*) or (psychosocial adj3 support*))).ti,ab.)

AND

Outcomes: ((Anhedonia/ or anhedonia*.ti,ab.) OR (Anxiety/ or (anxiat* or angst or hypervigilan* or nervousness).ti,ab.) OR (exp Behavioral Symptoms/ or (((affective or behavior*) adj3 symptom*) or alexithymia* or (emotion* adj3 disturbance*) or aggressi* or catatonis* or delusion* or depersonalization* or depressi* or ecopresis or enuresis or (urinary adj3 incontinence) or (daytime adj3 wetting) or bedwetting or (((functional or nonorganic or psychogenic) adj3 hearing adj3 loss*) or malingering or (mental adj3 fatigue*) or (neuropsychiatric adj3 symptom*) or obsessi* or paranoi* or ((primary or psychogenic) adj3 polydipsia*) or (problem adj3 behavior*) or (self adj3 (destructive or harm* or injur* or mutilat*)) or NSSH or NSSI or suicid* or ((life or psychological) adj3 stress*) or wandering).ti,ab.) OR (Cognitive Dysfunction/ or (((cognitive or mental) adj3 (dysfunction* or impair* or declin* or deteriorat*)) or (neurocognitive adj3 disorder*))).ti,ab.) OR (exp Confusion/ or (confusion* or disorientation* or bewilderment or delirium*).ti,ab.) OR (Death/ or (death or (end adj3 life)).ti,ab.) OR

(Diagnostic Self Evaluation/ or (self adj3 (appraisal* or evaluation*) or (self adj3 report* adj3 health) or (subjective adj3 health)).ti,ab.) OR (Frailty/ or (frail* or debilit*).ti,ab.) OR (Functional Status/ or (functional adj3 (declin* or dependence* or status*)).ti,ab.) OR (Hospitalization/ or hospitalization*.ti,ab.) OR (Illness Behavior/ or ((illness or sickness) adj3 behavior*).ti,ab.) OR (Lethargy/ or lethargy.ti,ab.) OR (Mental Health/ or ((mental or psychological) adj3 (health or well-being or wellbeing)).ti,ab.) OR (Morbidity/ or morbidit.ti,ab.) OR (Mortality/ or mortalit* or ((death or fatalit*) adj3 rate*).ti,ab.) OR (Patient Readmission/ or readmission*.ti,ab.) OR (Quality of Life/ or ((quality adj3 life) or HRQOL or (life adj3 satisfaction)).ti,ab.) OR ("Sleep Initiation and Maintenance Disorders"/ or (sleep adj5 (disorder* or dysfunction*) or DIMS or (early adj3 awakening) or insomnia* or sleeplessness).ti,ab.)

The syntax for Scopus as shown:

Setting: (TITLE-ABS(assisted W/3 living) OR (TITLE-ABS(((home* w/3 aged) or (old w/3 age w/3 home*) or (housing w/3 elderly) or (retirement w/3 (home* or center* or center*)))))) OR (TITLE-ABS(long w/3 term w/3 care)) OR (TITLE-ABS(((nursing w/3 home*) or (intermediate w/3 care w/3 facility*) or (skilled w/3 nursing w/3 facility*) or (extended w/3 (care or nursing) w/3 facilit*)))) OR (TITLE-ABS((rehab* w/3 (center* or center*) or (inpatient w/3 rehabilitation)))) OR (TITLE-ABS(residential w/3 facilit*)) OR (TITLE-ABS(((subacute or sub-acute or postacute or post-acute) w/3 care))))

AND

Determinant: (TITLE-ABS(friend* or companion* or acquaintance*) OR (TITLE-ABS((interpersonal or social*) w/3 relation*)) OR (TITLE-ABS(((group w/3 structure*) or (informal w/3 network*) or (network w/3 composition*)))) OR (TITLE-ABS(patient w/3 (exclu* or isolat* or seclu*)) OR (TITLE-ABS(peer w/3 (group* or relation*))) OR (TITLE-ABS(recreation* w/3 therap*)) OR (TITLE-ABS(social* w/3 inclu*)) OR (TITLE-ABS((social* w/3 (alienat* or breakdown* or depriv* or exclu* or isolat*) or ostraci* or lonel*)) OR (TITLE-ABS(social* w/3 (activit* or citizenship or engag* or participat*)) OR (TITLE-ABS(((interpersonal or social*) w/3 (ability* or competenc* or skill*)))) OR (TITLE-ABS((social* w/3 (care or connect* or support*) or (psychosocial w/3 support*))))

AND

Outcomes: (TITLE-ABS(anhedonia*) OR (TITLE-ABS(anxiet* or angst or hypervigilan* or nervousness)) OR (TITLE-ABS(((affective or behavior*) w/3 symptom*) or alexithymia* or (emotion* w/3 disturbance*) or aggressi* or catatoni* or delusion* or depersonalization* or depressi* or encopresis or enuresis or (urinary w/3 incontinence) or (daytime w/3 wetting) or bedwetting or ((functional or nonorganic or psychogenic) w/3 hearing w/3 loss*) or malingering or (mental w/3 fatigue*) or (neuropsychiatric w/3 symptom*) or obsessi* or paranoi* or ((primary or psychogenic) near/3 polydipsia*) or (problem w/3 behavior*) or (self w/3 (destructive or harm* or injur* or mutilat*)) or NSSH or NSSI or suicid* or ((life or psychological) w/3 stress*) or wandering)) OR (TITLE-ABS(((cognitive or mental) w/3 (dysfunction* or impair* or declin* or deteriorat*)) or (neurocognitive w/3 disorder*))) OR (TITLE-ABS(confusion* or disorientation* or bewilderment or delirium*)) OR (TITLE-ABS(death or (end w/3 life))) OR (TITLE-ABS((self w/3 (appraisal* or evaluation*) or (self w/3 report* w/3 health) or (subjective w/3 health))) OR (TITLE-ABS(frail* or debilit*)) OR (TITLE-ABS(functional w/3 (declin* or dependence* or status*)) OR (TITLE-ABS(hospitalization*)) OR (TITLE-ABS(((illness or sickness) w/3 behavior*)) OR (TITLE-ABS(lethargy)) OR (TITLE-ABS(((mental or psychological) w/3 (health or well-being or wellbeing)))) OR (TITLE-ABS(morbidity)) OR (TITLE-ABS((mortalit* or ((death or fatalit*) w/3 rate*))) OR (TITLE-ABS(readmission*)) OR (TITLE-ABS(((quality w/3 life) or HRQOL or (life w/3 satisfaction)))) OR (TITLE-ABS((sleep w/5 (disorder* or dysfunction*) or DIMS or (early w/3 awakening) or insomnia* or sleeplessness))))

The syntax for Cochrane Library as shown:

Setting: (MeSH descriptor: [Assisted Living Facilities] this term only

OR (assisted near/3 living) OR MeSH descriptor: [Homes for the Aged] this term only OR MeSH descriptor: [Housing for the Elderly] this term only OR ((home* near/3 aged) or (old near/3 age near/3 home*) or (housing near/3 elderly) or (retirement near/3 (home* or center* or center*))) OR MeSH descriptor: [Long-Term Care] this term only OR (long near/3 term near/3 care) OR MeSH descriptor: [Nursing Homes] explode all trees OR ((nursing near/3 home*) or (intermediate near/3 care near/3 facility*) or (skilled near/3 nursing near/3 facility*) or (extended near/3 (care or nursing) near/3 facilit*)) OR MeSH descriptor: [Rehabilitation Centers] this term only OR (rehab* near/3 (center* or center*) or (inpatient near/3 rehabilitation)) OR MeSH descriptor: [Residential Facilities] this term only OR (residential near/3 facilit*) OR MeSH descriptor: [Subacute Care] this term only OR ((subacute or sub-acute or postacute or post-acute) near/3 care))

AND

Determinant: (MeSH descriptor: [Friends] this term only OR (friend* or companion* or acquaintance*) OR MeSH descriptor: [Group Structure] this term only OR ((group near/3 structure*) or (informal near/3 network*) or (network near/3 composition*)) OR MeSH descriptor: [Interpersonal Relations] this term only OR ((interpersonal or social*) near/3 relation*) OR MeSH descriptor: [Patient Isolation] explode all trees OR (patient near/3 (exclu* or isolat* or seclu*)) OR MeSH descriptor: [Peer Group] this term only OR (peer near/3 (group* or relation*)) OR MeSH descriptor: [Recreation Therapy] this term only OR (recreation* near/3 therap*) OR MeSH descriptor: [Social Inclusion] this term only OR (social* near/3 inclu*) OR MeSH descriptor: [Social Isolation] this term only OR (social* near/3 (alienat* or breakdown* or depriv* or exclu* or isolat*) or ostraci* or lonel*) OR MeSH descriptor: [Social Participation] this term only OR (social* near/3 (activit* or citizenship or engag* or participat*)) OR MeSH descriptor: [Social Skills] this term only OR ((interpersonal or social*) near/3 (ability* or competenc* or skill*)) OR MeSH descriptor: [Social Support] explode all trees OR (social* near/3 (care or connect* or support*) or (psychosocial near/3 support*))

AND

Outcomes: (MeSH descriptor: [Anhedonia] this term only OR anhedonia* OR MeSH descriptor: [Anxiety] this term only OR (anxiet* or angst or hypervigilan* or nervousness) OR MeSH descriptor: [Behavioral Symptoms] explode all trees OR (((affective or behavior*) near/3 symptom*) or alexithymia* or (emotion* near/3 disturbance*) or aggressi* or catatoni* or delusion* or depersonalization* or depressi* or encopresis or enuresis or (urinary near/3 incontinence) or (daytime near/3 wetting) or bedwetting or ((functional or nonorganic or psychogenic) near/3 hearing near/3 loss*) or malingering or (mental near/3 fatigue*) or (neuropsychiatric near/3 symptom*) or obsessi* or paranoi* or ((primary or psychogenic) near/3 polydipsia*) or (problem near/3 behavior*) or (self near/3 (destructive or harm* or injur* or mutilat*)) or NSSH or NSSI or suicid* or ((life or psychological) near/3 stress*) or wandering) OR MeSH descriptor: [Cognitive Dysfunction] this term only OR (((cognitive or mental) near/3 (dysfunction* or impair* or declin* or deteriorat*)) or (neurocognitive near/3 disorder*)) OR MeSH descriptor: [Confusion] explode all trees OR (confusion* or disorientation* or bewilderment or delirium*) OR MeSH descriptor: [Death] this term only OR (death or (end near/3 life)) OR MeSH descriptor: [Diagnostic Self Evaluation] this term only OR (self near/3 (appraisal* or evaluation*) or (self near/3 report* near/3 health) or (subjective near/3 health)) OR MeSH descriptor: [Frailty] this term only OR (frail* or debilit*) OR MeSH descriptor: [Functional Status] this term only OR (functional near/3 (declin* or dependence* or status*)) OR MeSH descriptor: [Hospitalization] explode all trees OR hospitalization* OR MeSH descriptor: [Illness Behavior] this term only OR ((illness or sickness) near/3 behavior*) OR MeSH descriptor: [Lethargy] this term only OR lethargy OR MeSH descriptor: [Mental Health] this term only OR ((mental or psychological) near/3 (health or well-being or wellbeing)) OR MeSH descriptor: [Morbidity] this term only OR morbidity OR MeSH descriptor: [Mortality] this term only OR mortalit*

or ((death or fatalit*) near/3 rate*) OR MeSH descriptor: [Patient Readmission] this term only OR readmission* OR MeSH descriptor: [Quality of Life] this term only OR ((quality near/3 life) or HRQOL or (life near/3 satisfaction)) OR MeSH descriptor: [Sleep Initiation and Maintenance Disorders] this term only OR (sleep near/5 (disorder* or dysfunction*) or DIMS or (early near/3 awakening) or insomnia* or sleeplessness))

References

- Abbott, K. A., & Pachucki, M. C. (2021). Associations between social network characteristics, cognitive function, and quality of life among residents in a dementia special care unit: A pilot study. *Dementia (Basel, Switzerland)*, 16(8), 1004–1019.
- Ahmed, D., El Shair, I. H., Taher, E., & Zyada, F. (2014). Prevalence and predictors of depression and anxiety among the elderly population living in geriatric homes in Cairo. *Egypt. J Egypt Public Health Assoc.*, 89(3), 127–135. <https://doi.org/10.1097/01.EPX.0000455729.66131.49>. PMID: 25534177.
- Alarcão, V., Madeira, T., Peixoto-Plácido, C., Sousa-Santos, N., Fernandes, E., Nicola, P., & Gorjão-Clara, J. (2019). Gender differences in psychosocial determinants of self-perceived health among Portuguese older adults in nursing homes. *Aging & mental health*, 23(8), 1049–1056. <https://doi.org/10.1080/13607863.2018.1471583>. Epub 2018 May 23. PMID: 29791197.
- Anon, <https://www.crd.york.ac.uk/prospero/#aboutpage>, Accessed August 26, (2021).
- Anon, <https://grants.nih.gov/grants/guide/pa-files/PAR-19-373.html>, Accessed April 5, (2022).
- Badia, X., Schiaffino, A., Alonso, J., & Herdman, M. (1998). Using the EuroQoL 5-D in the Catalan general population: Feasibility and construct validity. *Quality of Life Research*, 7, 311–322.
- Ball, M. M., Whittington, F. J., Perkins, M. M., Patterson, V. L., Hollingsworth, C., King, S. V., et al. (2000). Quality of Life in Assisted Living Facilities: Viewpoints of Residents. *The Journal of Applied Gerontology*, 19(3), 304–325. September 2000.
- Banks, M. R., & Banks, W. A. (2002). The effects of animal-assisted therapy on loneliness in an elderly population in long-term care facilities. *Journal of Gerontology*, 57A(7), M428–M432.
- Banks, M. R., Willoughby, L. M., & Banks, W. A. (2008). Animal-assisted therapy and loneliness in nursing homes: Use of robotic versus living dogs. *Journal of American Medical Directors Association*, 9(3), 173–177.
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Beck depression inventory-ii* (pp. 72498–78204). San Antonio, TX.
- Bergland, Å., & Kirkevold, M. (2008). The significance of peer relationships to thriving in nursing homes. *Journal of Clinical Nursing*, 17(10), 1295–1302.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Cacioppo, J. T., & Cacioppo, S. (2018). The growing problem of loneliness. *Lancet (London, England)*, 391(10119), 426.
- Cacioppo, J. T., Hughes, M. E., Waite, L. J., Hawkley, L. C., & Thisted, R. A. (2006). Loneliness as a specific risk factor for depressive symptoms: Cross-sectional and longitudinal analyses. *Psychology and aging*, 21(1), 140–151.
- Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on psychological science: a journal of the Association for Psychological Science*, 10(2), 238–249. <https://doi.org/10.1177/1745691615570616>. PMID: 25866548; PMCID: PMC4391342.
- Campbell-Sills, L., & Stein, M. B. (2007). Psychometric analysis and refinement of the Connor-Davidson resilience scale (CD-RISC): Validation of a 10-item measure of resilience. *Journal of Traumatic Stress*, 20(6), 1019–1028. <https://doi.org/10.1002/jts.20271>
- Chiang, K. J., Chu, H., Chang, H. J., Chung, M. H., Chen, C. H., Chiou, H. Y., et al. (2010). The effects of reminiscence therapy on psychological well-being, depression, and loneliness among the institutionalized aged. *International journal of geriatric psychiatry*, 25(4), 380–388. <https://doi.org/10.1002/gps.2350>. PMID: 19697299.
- Choi, N. G., Ransom, S., & Wyllie, R. J. (2008). Depression in older nursing home residents: The influence of nursing home environmental stressors, coping, and acceptance of group and individual therapy. *Aging & Mental Health*, 12(5), 536–547. <https://doi.org/10.1080/13607860802343001>. PMID: 18855169.
- Chou, K. L., Jun, L. W., & Chim, I. (2005). Assessing Chinese older adults' suicidal ideation: Chinese version of the geriatric suicide ideation scale. *Aging & Mental Health*, 9, 167–171.
- Cotterell, N., Buffel, T., & Phillipson, C. (2018). Preventing social isolation in older people. *Maturita*, 113, 80–84.
- Cuijpers, P. (2001). Mortality and depressive symptoms in inhabitants of residential homes. *International Journal of Geriatric Psychiatry*, 16(2), 131–138. [https://doi.org/10.1002/1099-1166\(200102\)16:2<131::Aid-gps283>3.0.co;2-w](https://doi.org/10.1002/1099-1166(200102)16:2<131::Aid-gps283>3.0.co;2-w). PMID: 11241717.
- Cutrona, C. E., & Russell, D. W. (1987). The provisions of social relationships and adaptation to stress. In W. H., Jones, & D., Perlman (Eds.), *Advances in personal relationships. A research annual I* (pp. 37–67). Greenwich, CT: Jai Press.
- Dahlberg, K., Dahlberg, H., & Nystrom, M. (2008). *Reflective lifeworld research* (2nd edition). Lund: Studentlitteratur.
- Davison, T. E., McCabe, M. P., Busija, L., Graham, A., Camões-Costa, V., Kelly, J., et al. (2021). The effectiveness of the Program to Enhance Adjustment to Residential Living (PEARL) in reducing depression in newly admitted nursing home residents. *Journal of Affective Disorders*, 282, 1067–1075. <https://doi.org/10.1016/j.jad.2020.12.087>. Epub 2020 Dec 27. PMID: 33601679.
- Davison, T. E., McCabe, M. P., Busija, L., O'Connor, D. W., Costa, V. C., & Byers, J. (2020). A cluster randomised trial of the program to enhance adjustment to residential living (PEARL): A novel psychological intervention to reduce depression in newly admitted aged care residents. *BMC geriatrics*, 20(1), 98. <https://doi.org/10.1186/s12877-020-1492-5>. PMID: 32164587; PMCID: PMC7068981.
- de Jong Gierveld, J., & van Tilburg, T. (1999). *Manual of the loneliness scale*. Amsterdam: Department of Social Research Methodology, VU University Hospital.
- De Jong-Gierveld, J., & Kamphuis, F. (1985). The development of a Rash-type Loneliness Scale. *Applied Psychological Measurement*, 3, 289–299.
- Dean, K., Jenkinson, C., Wilcock, G., & Walker, Z. (2014). The development and validation of a patient-reported quality of life measure for people with mild cognitive impairment. *International Psychogeriatrics*, 26, 487–497.
- DeSalvo, K. B., Fan, V. S., McDonnell, M. B., & Fihn, S. D. (2005). Predicting mortality and healthcare utilization with a single question. *Health Services Research*, 40(4), 1234–1246.
- Downes, M. J., Brennan, M. L., Williams, H. C., & Dean, R. S. (2016). Development of a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). *BMJ Open*, 6, Article E011458.
- Downs, S. H., & Black, N. (1998). The feasibility of creating a checklist for the assessment of the methodological quality both of randomised and non-randomised studies of health care interventions. *Journal of Epidemiology and Community Health*, 52, 377–384.
- Drageset, J., Dysvik, E., Espehaug, B., Natvig, G. K., & Furnes, B. (2015). Suffering and mental health among older people living in nursing homes—a mixed-methods study. *PeerJ*, 3, E1120. <https://doi.org/10.7717/peerj.1120>. PMID: 26246967; PMCID: PMC4525699.
- Drageset, J., Eide, G. E., Kirkevold, M., & Ranhoff, A. H. (2013). Emotional loneliness is associated with mortality among mentally intact nursing home residents with and without cancer: A five-year follow-up study. *Journal of Clinical Nursing*, 22(1–2), 106–114. doi: 10.1111/j.1365-2702.2012.04209.x. Epub 2012 Aug 9. PMID: 22882807.
- Drageset, J., Espehaug, B., & Kirkevold, M. (2012). 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*, 21(7–8), 965–974. doi: 10.1111/j.1365-2702.2011.03932.x. Epub 2012 Jan 18. PMID: 22250600.
- Eisses, A. M., Kluitert, H., Jongenelis, K., Pot, A. M., Beekman, A. T., & Ormel, J. (2004). Risk indicators of depression in residential homes. *International Journal of Geriatric Psychiatry*, 19(7), 634–640. Juldoi: 10.1002/gps.1137. PMID: 15254919.
- EuroQoL Group. (1990). EuroQoL—A new facility for the measurement of healthrelated quality of life. *Health Policy (Amsterdam, Netherlands)*, 16, 199–208.
- Fereday, J., & Muir-Cochrane, E. (2006). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International Journal of Qualitative Methods*, 5(1), 80–92.
- Fessman, N., & Lester, D. (2000). Loneliness and depression among elderly nursing home patients (2000). *International Journal of Aging And Human Development*, 51(2), 137–141.
- Fokkema, C. M., & van Tilburg, T. G. (2007). Loneliness interventions among older adults: Sense or nonsense? *Tijdschrift Voor Gerontologie en Geriatrie*, 38(4), 185–203.
- Freedman, A., & Nicolle, J. (2020). Social isolation and loneliness: The new geriatric giants. *Can Fam Physicia*, 66(3), 176–182.
- Friedman, B., Delavan, R. L., Sheeran, T. H., & Bruce, M. L. (2009). The effect of major and minor depression on Medicare home healthcare services use. *Journal of the American Geriatrics Society*, 57(4), 669–675.
- Gan, P., Xie, Y., Duan, W., Deng, Q., & Yu, X. (2015). Rumination and Loneliness Independently Predict Six-Month Later Depression Symptoms among Chinese Elderly in Nursing Homes. *PLoS one*, 10(9), Article E0137176. Sep 3.
- Gardiner, C., Laud, P., Heaton, T., & Gott, M. (2020). What is the prevalence of loneliness amongst older people living in residential and nursing care homes? A systematic review and meta-analysis. *Age and ageing*, 49(5), 748–757. <https://doi.org/10.1093/ageing/afaa049>. Aug 24PMID: 32396600.
- Graneheim, U.H., & Lundman, B. (2004). Qualitative content analysis in nursing research: Concepts.
- Green, J., & Thorogood, N. (2004). *Qualitative methods for health research*. First. London: Sage Publications.
- Hanratty, B., Stow, D., Collingridge Moore, D., Valtorta, N. K., & Matthews, F. (2018). Loneliness as a risk factor for care home admission in the English Longitudinal Study of Ageing. *Age and ageing*, 47(6), 896–900. Nov 1.
- Hawkley, L. C., Masi, C. M., Berry, J. D., & Cacioppo, J. T. (2006). Loneliness is a unique predictor of age-related differences in systolic blood pressure. *Psychology and aging*, 21(1), 152–164. <https://doi.org/10.1037/0882-7974.21.1.152>. MarPMID: 16594800.
- Hawthorne, G. (2006). Measuring social isolation in older adults: Development and initial validation of the Friendship Scale. *Social Indicators Research*, 77(3), 521–548.
- Hays, R. D., & DiMatteo, M. R. (1987). A short-form measure of loneliness. *Journal of Personality Assessment*, 51(1), 69–81.
- Heisel, M. J. (2019). Loneliness and suicide ideation in older adults: A longitudinal investigation. *Innovation in Aging*, 3(Sup 1), S594. <https://doi.org/10.1093/geroni/igz038.2205>
- Horwath, U., & Szczerbińska, K. (2017). Determinants of late-life depression in residents of long-term care facility. *Pol Merkur Lekarski*, 43(257), 213–219. Nov 23PMID: 29231914.
- Hughes, M. E., Waite, L. J., Hawkley, L. C., & Cacioppo, J. T. (2004). A Short Scale for Measuring Loneliness in Large Surveys: Results From Two Population-Based Studies. *Research on Aging*, 26(6), 655–672. <https://doi.org/10.1177/0164027504268574>

- Iden, K. R., Ruths, S., & Hjørleifsson, S. (2015). Residents' perceptions of their own sadness—a qualitative study in Norwegian nursing homes. *BMC geriatrics*, 15, 21. <https://doi.org/10.1186/s12877-015-0019-y>. Mar 8PMID: 25888453; PMCID: PMC4356108.
- Jansson, A. H., Muurinen, S., Savikko, N., Soini, H., Suominen, M. M., Kautiainen, H., et al. (2017). Loneliness in nursing homes and assisted living facilities: Prevalence, associated factors and prognosis. *J Nur Home Res Sc*, 3, 43–49.
- Jansson, A. H., Savikko, N., Kautiainen, H., Raito, H. M., & Pitkälä, K. H. (2020). Changes in prevalence of loneliness over time in institutional settings, and associated factors. *Archives of gerontology and geriatrics*, 89, Article 104043. <https://doi.org/10.1016/j.archger.2020.104043>. Jul-AugEpub 2020 May 12. PMID: 32442846.
- Jaremka, L. M., Fagundes, C. P., Peng, J., et al. (2013). Loneliness promotes inflammation during acute stress. *Psychological science*, 24(7), 1089–1097. <https://doi.org/10.1177/0956797612464059>
- Jessen, J., Cardiello, F., & Baum, M. M. (1996). Avian companionship in alleviation of depression, loneliness, and low morale of older adults in skilled rehabilitation. *Psychological Reports*, 78, 339–348.
- Jones, A. L., Dwyer, L. L., & Bercovitz, A. R. (2009). The National Nursing Home Survey: 2004 overview. *Vital Health Stat*, 13(167), 1–155. <http://www.ncbi.nlm.nih.gov/pubmed/19655659> Accessed April 7, 2022.
- Jongenelis, K., Pot, A. M., Eisses, A. M., Beekman, A. T., Kluitert, H., & Ribbe, M. W. (2004). Prevalence and risk indicators of depression in elderly nursing home patients: The AGED study. *Journal of affective disorders*, 83(2–3), 135–142. <https://doi.org/10.1016/j.jad.2004.06.001>. PMID: 15555706.
- Kaelen, S., van den Boogaard, W., Pellecchia, U., Spiers, S., De Cramer, C., Demaegd, G., et al. (2021). How to bring residents' psychosocial wellbeing to the heart of the fight against Covid-19 in Belgian nursing homes—A qualitative study. *PLoS one*, 16(3). <https://doi.org/10.1371/journal.pone.0249098>. E0249098.
- King, N., & Horrocks, C. (2010). *Interviews in qualitative research*. New York, NY: SAGE.
- Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*.
- Li, X., Phillips, M. R., Tong, Y., Li, K., Zhang, Y., Zhang, Y., & Yajua, N. (2017). Reliability and validity of the Chinese version of Beck Suicide Ideation Scale (BSI-CV) in adult community residents. *Chinese Mental Health Journal*, 24, 250–255.
- Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the depression anxiety stress scales (DASS) with the Beck depression and anxiety inventories. *Behaviour research and therapy*, 33, 335–343.
- Luo, Y., & Waite, L. J. (2014). Loneliness and mortality among older adults in China. *Journal of Gerontology B Psychological Sciences and Social Sciences*, 69, 633–645.
- Mahoney, F., & Barthel, D. (1965). Functional evaluation: The Barthel Index. *Maryland State Medical Journal*, 14, 56–61.
- Malterud, K. (2012). Systematic text condensation: A strategy for qualitative analysis. *Scandinavian Journal of Public Health*, 40(8), 795–805.
- Masi, C. M., Chen, H. Y., Hawkey, L. C., & Cacioppo, J. T. (2011). A meta-analysis of interventions to reduce loneliness. *Personality and social psychology review: an official journal of the Society for Personality and Social Psychology, Inc*, 15(3), 219–266.
- Moher, D., Liberati, A., Tetzlaff, J., et al. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ (Clinical research ed.)*, 21(339), B2535.
- Morley, J. E., Malmstrom, T. K., & Miller, D. K. (2012). A simple frailty questionnaire (FRAIL) predicts outcome in middle aged African Americans. *The Journal of Nutrition and Aging*, 16, 601–608.
- Morse, J. M., & Niehaus, L. (2009). *Mixed-method design: Principles and procedures*. Walnut Creek: Left Coast Press.
- Moyle, W., Kellett, U., Ballantyne, A., & Gracia, N. (2011). Dementia and loneliness: An Australian perspective. *Journal of clinical nursing*, 20(9–10), 1445–1453. <https://doi.org/10.1111/j.1365-2702.2010.03549>. Mayx. Epub 2011 Mar 1. PMID: 21366740.
- Mykletun, A., Stordal, E., & Dahl, A. A. (2001). Hospital Anxiety and Depression (HAD) scale: Factor structure, item analyses and internal consistency in a large population. *Br. J. Psychiatry*, 179, 540–544. <https://doi.org/10.1192/bjp.179.6.540>
- National Academies of Sciences, Engineering, and Medicine, <https://doi.org/10.17226/25663>. (2020). *Social isolation and loneliness in older adults: Opportunities for the health care system*. Washington, DC: The National Academies Press.
- Neves, B., Sanders, A., & Kokanović, R. (2019). It's the worst bloody feeling in the world": Experiences of loneliness and social isolation among older people living in care homes. *Journal of aging studies*, 49, 74–84. <https://doi.org/10.1016/j.jaging.2019.100785>. JunEpub 2019 Jun 6. PMID: 31229221.
- NIA Social isolation, loneliness in older people pose health risks. April 23, 2019. <https://www.nia.nih.gov/news/social-isolation-loneliness-older-people-pose-health-risks>
- Nikmat, A. W., Hashim, N. A., Omar, S. A., & Razalli, S. (2015). Depression and loneliness/social isolation among patients with cognitive impairment in nursing home. *ASEAN Journal of Psychiatry*, 16(2). July - DecembeXX-XX.
- Noone, C., McSharry, J., Smalle, M., Burns, A., Dwan, K., Devane, D., et al. (2020). Video calls for reducing social isolation and loneliness in older people: A rapid review. *Cochrane Database of Systematic Review*, (5) <https://doi.org/10.1002/14651858.CD013632>. Art. No.: CD013632 Accessed 05 April 2022.
- Ong, A. D., Uchino, B. N., & Wethington, E. (2016). Loneliness and Health in Older Adults: A Mini-Review and Synthesis. *Gerontology*, 62(4), 443–449. <https://doi.org/10.1159/000441651>. Epub 2015 Nov 6.
- O'Rourke, H. M., Collins, L., & Sidani, S. (2018). Interventions to address social connectedness and loneliness for older adults: A scoping review. *BMC Geriatric*, 18, 1–13.
- Österlind, J., Ternstedt, B. M., Hansebo, G., & Hellström, I. (2017). Feeling lonely in an unfamiliar place: Older people's experiences of life close to death in a nursing home. *International journal of older people nursing*, 12(1). <https://doi.org/10.1111/opa.12129>. MarEpub 2016 Sep 14. PMID: 27624362.
- Paque, K., Bastiaens, H., Van Bogaert, P., & Dilles, T. (2018). Living in a nursing home: A phenomenological study exploring residents' loneliness and other feelings. *Scandinavian journal of caring sciences*, 32(4), 1477–1484. <https://doi.org/10.1111/scs.12599>. DecEpub 2018 Aug 2. PMID: 30070385.
- Peplau, L. A., Perlman, D., Peplau, L. A., & Perlman, D. (1982). Perspectives on loneliness. *Loneliness: A sourcebook of current theory, research and therapy* (pp. 1–8). New York: Wiley.
- Perissinotto, C. M., Stijacic Cenzer, I., & Covinsky, K. E. (2012). Loneliness in older persons: A predictor of functional decline and death. *Archives of Internal Medicine*, 172(14), 1078–1083.
- Poey, J. L., Burr, J. A., & Roberts, J. S. (2017). Social connectedness, perceived isolation, and dementia: Does the social environment moderate the relationship between genetic risk and cognitive well-being? *Gerontologist*, 6, 1031–1040.
- Prieto-Flores, M. E., Forjaz, M. J., Fernandez-Mayoralas, G., Rojo-Perez, F., & Martinez-Martin, P. (2011). Factors associated with loneliness of noninstitutionalized and institutionalized older adults. *Journal of aging and health*, 23(1), 177–194. Feb.
- Radloff, L. S. (1977). The CES-D scale a self-report depression scale for research in the general population. *Applied psychological measurement*, 1(3), 385–401.
- Ribbe, M. W., Ljunggren, G., Steel, K., et al. (1997). Nursing homes in 10 nations: A comparison between countries and settings. *Age and ageing*, 26(Suppl 2), 3–12.
- Russell, D., Peplau, L. A., & Cutrona, C. E. (1980). The revised UCLA loneliness scale. *Journal of Personality and Social Psychology*, 39, 472–480.
- Russell, D., Peplau, L. A., & Ferguson, M. L. (1978). Developing a measure of loneliness. *Journal of Personality Assessment*, 42, 290–294.
- Russell, D., Cutrona, C. E., de la Mora, A., & Wallace, R. B. (1997). Loneliness and nursing home admission among rural older adults. *Psychology and Aging*, 12, 574–589.
- Shamseer, L., Moher, D., Clarke, M., Ghersi, D., Liberati, A., Petticrew, M., & Group, P. R. I. SMA-P. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: Elaboration and explanation. *BMJ (Clinical research ed.)*, 350, G7647. <https://doi.org/10.1136/bmj.g7647>. Jan 2.
- Shankar, A., Hamer, M., McMunn, A., & Steptoe, A. (2013). Social isolation and loneliness: Relationships with cognitive function during 4 years of follow-up in the English Longitudinal Study of Ageing. *Psychosomatic medicine*, 75(2), 161–170.
- Shankar, A. (2020). Loneliness and sleep in older adults. *Social psychiatry and psychiatric epidemiology*, 55(2), 269–272. <https://doi.org/10.1007/s00127-019-01805-8>. FebEpub 2019 Nov 15. PMID: 31729538.
- Shapira, N., Barak, A., & Gal, I. (2007). Promoting older adults' well-being through Internet training and use. *Aging & Mental Health*, 11(5), 477–484.
- Sheikh, J. I., & Yesavage, J. A. (1986). Geriatric Depression Scale (GDS): Recent evidence and development of a shorter version. In T. L. Brink (Ed.), *Clinical gerontology: A guide to assessment and intervention* (pp. 165–173). New York, NY: The Haworth Press.
- Sokolovsky, Jay. (2009). *The cultural context of aging: Worldwide perspectives*. Praeger Publishers/Greenwood Publishing Group.
- Strauss, A., & Corbin, J. (1990). *The basics of qualitative research: Grounded theory procedures and techniques*. Newbury Park, CA: Sage.
- Tiong, W. W., Yap, P., Huat Koh, G. C., Phoon Fong, N., & Luo, N. (2013). Prevalence and risk factors of depression in the elderly nursing home residents in Singapore. *Aging & mental health*, 17(6), 724–731. <https://doi.org/10.1080/13607863.2013.775638>. Epub 2013 Mar 6. PMID: 23461826.
- Tong, A., Sainsbury, P., & Craig, J. (2007). Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International journal for quality in health care: journal of the International Society for Quality in Health Care / ISQua*, 19(6), 349–357.
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27(3), 247–259.
- Trybusińska, D., & Saracen, A. (2019). Loneliness in the Context of Quality of Life of Nursing Home Residents. *Open Med (Wars)*, 14, 354–361. <https://doi.org/10.1515/med-2019-0035>. Apr 24PMID: 31157300; PMCID: PMC654106.
- Tse, M. M., Lai, C., Lui, J. Y., Kwong, E., & Yeung, S. Y. (2016). Frailty, pain and psychological variables among older adults living in Hong Kong nursing homes: Can we do better to address multimorbidities? *Journal of psychiatric and mental health nursing*, 23(5), 303–311. <https://doi.org/10.1111/jpm.12303>. PMID: 27307261.
- Wang, Y. Y., Jiang, N. Z., Cheung, E. F., Sun, H. W., & Chan, R. C. (2015). Role of depression severity and impulsivity in the relationship between hopelessness and suicidal ideation in patients with major depressive disorder. *Journal of Affective Disorders*, 183, 83–89. <https://doi.org/10.1016/j.jad.2015.05.001>
- Ware, Jr, J.E., & Sherbourne, C.D. (1992). The MOS 36-item short-form health survey. SF-36. I.
- White, H., McConnell, E., Clipp, E., Branch, L. G., Sloane, R., Pieper, C., et al. (2002). A randomized controlled trial of the psychosocial impact of providing internet training and access to older adults. *Aging & Mental Health*, 6(3), 213–221.
- White, H., McConnell, E., Clipp, E., Bynum, L., Teague, C., Navas, L., et al. (1999). Surfing the net in later life: A review of the literature and pilot study of computer use and quality of life. *The Journal of Applied Gerontology*, 18(3), 358–378.
- Winningham, R. G., & Pike, N. L. (2007). A cognitive intervention to enhance institutionalized older adults' social support networks and decrease loneliness. *Aging & Mental Health*, 11(6), 716–721.
- Yang, Y., Wang, R., Zhang, D., Zhao, X., & Su, Y. (2021). How Loneliness Worked on Suicidal Ideation among Chinese Nursing Home Residents: Roles of Depressive Symptoms and Resilience. *International journal of environmental research and public health*, 18(10), 5472. <https://doi.org/10.3390/ijerph18105472>. May 20PMID: 34065364; PMCID: PMC8160705.

- Yang, Y. C., McClintock, M. K., Kozloski, M., & Li, T. (2013). Social isolation and adult mortality: The role of chronic inflammation and sex differences. *Journal of health and social behavior*, *54*(2), 183–203.
- Yesavage, J., Brink, T., Rose, T., Lum, O., Huang, B., Adey, M., et al. (1983). Development and validation of a Geriatric Depression Scale: A preliminary report. *Journal of psychiatric research*, *17*, 37–49.
- Zafar, J., Malik, N. I., Atta, M., Makhdoom, I. F., Ullah, I., & Manzar, M. D. (2021). Loneliness may mediate the relationship between depression and the quality of life among elderly with mild cognitive impairment. *Psychogeriatrics: the official journal of the Japanese Psychogeriatric Society*, *21*(5), 805–812. Sep.
- Zavaleta, D., Samuel, K., & Mills, C. (2020). Social isolation: A conceptual and measurement proposal. OPHI Working Paper No. 67. <https://www.ophi.org.uk/wp-content/uploads/ophi-wp-67.pdf>; accessed April 1.
- Zhang, D., Wang, R., Zhao, X., Zhang, J., Jia, J., Su, Y., et al. (2021). Role of resilience and social support in the relationship between loneliness and suicidal ideation among Chinese nursing home residents. *Aging & mental health*, *25*(7), 1262–1272. <https://doi.org/10.1080/13607863.2020.1786798>. JulEpub 2020 Jun 30. PMID: 32602736.
- Zhang, D., Yang, Y., Sun, Y., Wu, M., Xie, H., Wang, K., & Su, Y. (2017). Characteristics of the Chinese rural elderly living in nursing homes who have suicidal ideation: A multiple regression model. *Geriatric nursing (New York, N.Y.)*, *38*(5), 423–430. <https://doi.org/10.1016/j.gerinurse.2017.02.005>. Sep-OctEpub 2017 Mar 25. PMID: 28347559.
- Zhao, M., Gao, J., Li, M., & Wang, K. (2019). Relationship Between Loneliness and Frailty Among Older Adults in Nursing Homes: The Mediating Role of Activity Engagement. *Journal of the American Medical Directors Association*, *20*(6), 759–764. <https://doi.org/10.1016/j.jamda.2018.11.007>. JunEpub 2019 Jan 7. PMID: 30630725.
- Zhao, X., Zhang, D., Wu, M., Yang, Y., Xie, H., Li, Y., & Su, Y. (2018). Loneliness and depression symptoms among the elderly in nursing homes: A moderated mediation model of resilience and social support. *Psychiatry research*, *268*, 143–151. <https://doi.org/10.1016/j.psychres.2018.07.011>. OctEpub 2018 Jul 9. PMID: 30025285.
- Zigmond, A. S., & Snaith, R. P. (1983a). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*, *67*, 361–370.
- Zigmond, A. S., & Snaith, R. P. (1983b). The hospital anxiety and depression scale. *Acta Psychiatrica*.
- Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, *52*(1), 30–41. https://doi.org/10.1207/s15327752jpa5201_2
- Zimey, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, *52*, 30–41. https://doi.org/10.1207/s15327752jpa5201_2
- Zung, W. W. (1965). A self-rating depression scale. *Archives of General Psychiatry*, *12*, 63–70.