REVIEW

Loneliness prevalence of community-dwelling older adults and the impact of the mode of measurement, data collection, and country: A systematic review and meta-analysis

Hannelore Stegen,[1,2] Daan Duppen,[1] Perseverence Savieri,[3,4] Lara Stas,[3,4] Honghui Pan,[1,5] Marja Aartsen,[6] Hannelore Callewaert,[1] Eva Dierckx[1,7] and Liesbeth De Donder[1]

[1]*Society and Ageing Research Lab (SARLab), Vrije Universiteit Brussel (VUB), Brussels, Belgium*
[2]*Research Foundation Flanders (FWO), Brussels, Belgium*
[3]*Core facility - Support for Quantitative and Qualitative Research (SQUARE), Vrije Universiteit Brussel (VUB), Brussels, Belgium*
[4]*Biostatistics and Medical Informatics Research Group, Vrije Universiteit Brussel (VUB), Brussels, Belgium*
[5]*Brussels Interdisciplinary Research centre on Migration and Minorities (BIRMM), Brussels, Belgium*
[6]*Norwegian Social Research, OsloMet – Oslo Metropolitan University, Oslo, Norway*
[7]*Alexianen Zorggroep Tienen, Psychiatric Clinic, Tienen, Belgium*

ABSTRACT

Objectives: The aim of this systematic review and meta-analysis is to assess the prevalence of loneliness in many countries worldwide which have different ways of assessing it.

Design: Systematic review and meta-analysis.

Setting: We searched seven electronic databases for English peer-reviewed studies published between 1992 and 2021.

Participants: We selected English-language peer-reviewed articles, with data from non-clinical populations of community-dwelling older adults (>60 years), and with "loneliness" or "lonely" in the title.

Measurements: A multilevel random-effects meta-analysis was used to estimate the prevalence of loneliness across studies and to pool prevalence rates for different measurement instruments, data collection methods, and countries.

Results: Our initial search identified 2,021 studies of which 45 ($k = 101$ prevalence rates) were included in the final meta-analysis. The estimated pooled prevalence rate was 31.6% ($n = 168,473$). Measurement instrument was a statistically significant moderator of the overall prevalence of loneliness. Loneliness prevalence was lowest for single-item questions and highest for the 20-item University of California-Los Angeles Loneliness Scale. Also, differences between modes of data collection were significant: the loneliness prevalence was significantly the highest for face-to-face data collection and the lowest for telephone and CATI data collection. Our moderator analysis to look at the country effect indicated that four of the six dimensions of Hofstede also caused a significant increase (Power Distance Index, Uncertainty Avoidance Index, Indulgence) or decrease (Individualism) in loneliness prevalence.

Conclusions: This study suggests that there is high variability in loneliness prevalence rates among community-dwelling older adults, influenced by measurement instrument used, mode of data collection, and country.

Key words: Loneliness, loneliness prevalence, community-dwelling older adults, systematic review, meta-analysis, loneliness measurement

Correspondence should be addressed to: Hannelore Stegen, Society and Ageing Research Lab (SARLab), Vrije Universiteit Brussel (VUB), Pleinlaan 2, Brussels 1050, Belgium. Tel: + 32 (0)2 629 26 74. E-mail: hannelore.stegen@vub.be

Introduction

Lonely people can be at increased risk of death (Elovainio *et al.*, 2017). In many countries, loneliness has arisen in the last few years on the policy

agenda as an important societal challenge, which was amplified by the COVID pandemic (Lampraki *et al.*, 2022). Moreover, socially and emotionally satisfying contacts can form a buffer against loneliness in later life when negative life events may occur (Switsers *et al.*, 2021). Although loneliness in older adults is sometimes called a "silent epidemic," estimates of loneliness prevalence differ widely across nations and across different assessment scales.

Perlman and Peplau defined loneliness in 1981 as "the unpleasant experience that occurs when a person's network of social relations is deficient in some important way, either quantitatively or qualitatively" (Perlman & Peplau, 1981, 31). De Jong Gierveld's definition from 1987 adds that "this includes situations, in which the number of existing relationships is smaller than is considered desirable or admissible, as well as situations where the intimacy one wishes for has not been realized" (de Jong Gierveld, 1987, 120). Both definitions describe loneliness as a negative and subjective feeling, which is in contrast to, e.g. social isolation, which refers to the objective situation and the absence of relationships with other people (De Jong Gierveld *et al.*, 2006).

The WHO reports that there are no global assessments of the proportion of community-dwelling older people who are experiencing loneliness, but estimates that between 20% and 34% of older people in China, Europe, Latin America and the United States are lonely (World Health Organization, 2021). A recent meta-analysis based on prevalence data from 106 countries in 24 studies suggests that older adults ($\geq$ 60 years; not explicitly community dwelling) in general have a higher prevalence of loneliness compared with their younger counterparts (i.e., young adults [18–29 years] and middle-aged adults [30–59 years]) (Surkalim *et al.*, 2022).

Today, however, there is a high variability in loneliness prevalence (Surkalim *et al.*, 2022). Possible explanations are differences in culture (Jylhä & Jokela, 1990), demography (Fokkema *et al.*, 2012), socioeconomic status (Hansen & Slagsvold, 2016) or trust (Rapolienė & Aartsen, 2021). Another recent systematic review and meta-analysis on the prevalence of loneliness among older people in high-income countries (not explicitly community dwelling) hypothesizes that high variability between different prevalence studies could be influenced by differences in used measurement instruments and different modes of data collection (e.g., face-to-face, written questionnaires, etc.) (Chawla *et al.*, 2021). Today, the use of different measurement instruments is increasing (e.g., Awad *et al.*, 2023) using the De Jong Gierveld Loneliness Scale and Ost-Mor *et al.* (2023) using the (University of California-Los Angeles (UCLA) Loneliness Scale, so the multidimensionality of loneliness is already widely recognized.

However, current research suggests that loneliness measures should be considered carefully in relation to the opposed research question(s) of a study and encourages researchers to include multiple measures in their studies to ensure robustness and to identify potential discrepancies among measures in existing and future research (Mund *et al.*, 2022). Su *et al.* (2023) published a systematic review on the prevalence of loneliness and social isolation among older adults during the COVID-19 pandemic, but the influence of measurement instrument and mode of data collection were not treated. Through a systematic literature review and meta-analysis, this study reviews the prevalence of loneliness among community-dwelling older adults in countries worldwide and examines the study characteristics of these loneliness prevalence studies with specific attention to the influence of measurement instruments, mode of data collection, and the country where the study was conducted.

Methods

Search strategy and selection criteria

This study follows the recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page *et al.*, 2021). We screened seven electronic databases, i.e., Web of Science, PubMed, Sociological Abstracts, Social Services Abstracts, Embase, PsycINFO, and Cochrane Library, for eligible studies. The literature search included studies published between January 1, 1992 and October 31, 2021. We used "loneliness" as a search term in the title, "community-dwelling older adults" and "prevalence" as search terms in title and abstract, as well as possible variations, keywords and MeSH headings, if applicable for the database. The detailed search strategy can be found in Appendix 1 (published as supplementary material online attached to the electronic version of this paper at https://www.cambridge.org/core/journals/international-psychogeriatrics).

Authors HS and HC selected the studies derived from Web of Science and PubMed. HS and DD selected studies from Sociological Abstracts, Social Services Abstracts, PsycINFO, Embase, and Cochrane Library. After removing duplicates for both selection processes, a random sample of 10% was assessed by HS and HC for Web of Science and PubMed, and by HS and DD for the five other databases, to make sure the different

authors selected studies based on the same benchmarks. To decide upon inclusion, the title, the abstract and eventually the full text of the study (if necessary) were screened. When one of the selection criteria was not met, the study was excluded without evaluating the other selection criteria. In case of doubt, HP, LDD, and ED decided together upon in- or exclusion. Reference lists from the included studies and studies citing our included studies were screened in the final stage to assure no further studies would be left unnoticed.

Studies were eligible if "loneliness" or "lonely" was mentioned in the title of English-language peer-reviewed studies and if data was reported on a non-clinical population of community-dwelling older adults where a minimum age of 60 years was specified. The definition of community-dwelling older people by Steultjens *et al.* (2004) was followed, stating that community-dwelling older people are "people aged 60 years or older living independently," and therefore not living in institutionalized settings such as nursing homes, care homes or other types of residential care (Steultjens *et al.*, 2004). The final inclusion criterion was that studies should have as an explicit aim to estimate the loneliness prevalence, since clearly outlining the explicit purpose of the study contributes to a paper of better quality (Mack, 2015). The primary objective of prevalence studies is to produce frequency estimates for the overall population, and sometimes population subgroups (Boyle, 1998). Altogether, prevalence studies about loneliness among community-dwelling older adults were selected for this study. Studies from all countries and world regions were included to get a complete image of existing prevalence studies and the corresponding loneliness measurement instruments and modes of data collection, since there are known differences between countries and cultures in terms of loneliness prevalence.

Data analysis

The following data were extracted: year of publication, year of data collection, was the study conducted pre- or during-COVID, sample size (of loneliness questions), percentage of women, type of sample, country (reclustered into region), level on which the study was conducted (national or regional), mode of data collection, data source (own or existing dataset), and used measurement instruments.

As part of the meta-analysis, the quality of the studies was appraised by HS and DD using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist (Munn *et al.*, 2020). HS and DD first appraised all studies separately, and when no initial consensus was found, they decided together upon

inclusion. Following JBI Checklist guidelines, studies included for review were given a quality cutoff score (Munn *et al.*, 2020), whereby studies with a "low-quality" score (0–3) were excluded and studies with moderate (4–6) and high (7–9) quality scores were included for the meta-analysis. We also excluded papers in the meta-analysis if they used data that had already been used in another paper or data that originated from the same wave in the same database, and included the most complete or recent studies.

For the meta-analysis, carried out by PS and HS, supervised by LS, uniform response options were needed, and therefore we dichotomized the loneliness answers of all the studies to include them in the meta-analysis; this means that studies with more than two categories were also dichotomized. Furthermore, for articles using the De Jong Gierveld loneliness scale, when other cut-off scores than the proposed scores of De Jong Gierveld & van Tilburg (De Jong Gierveld & van Tilburg, 1999) were used, we recalculated the prevalence percentages, using the original dataset received upon request from the original authors. For the UCLA loneliness scales, we did not do this, since the authors did not propose any cutoff scores and since they indicated that there are no diagnostic criteria for being lonely (Russell, 1996). We therefore followed the cutoff that each of the studies proposed since we then had some clarity in who is considered as "lonely" in each of the studies.

In this review, all measurement instruments capture momentary loneliness, meaning that they measure loneliness as it is "now," at the moment of measuring (Compernolle *et al.*, 2021). The answers of the participants, both on the De Jong Gierveld Loneliness Scale as well as on the UCLA Loneliness Scale and the single-item questions, are subjective to how people feel at the moment of answering the question(s), even if they ask about loneliness, e.g., in the past week. Of all prevalence studies, none included a measurement tool that measured lifetime prevalence. This means that in this study, specifically point prevalences of loneliness are being studied. Therefore, it was appropriate to compare all the different prevalence percentages, since they all cover this momentary loneliness, mentioning a point prevalence percentage of loneliness.

Further information on the quality appraisal including the completed JBI Critical Appraisal Checklist for each study can be found in Appendix 2, as well as an overview of the classification (not/mildly lonely vs. lonely) that can be found in Appendix 3 (both published as supplementary material online attached to the electronic version of this paper at https://www.cambridge.org/core/journals/international-psychogeriatrics).

Following this, two steps were undertaken: the calculation of the pooled prevalence and a moderator analysis. First, a generalized linear mixed model (GLMM) was constructed. Such a model can directly model event counts with binomial likelihoods and fully account for within-study uncertainties (Lin & Xu, 2020). This approach has several advantages over the two-step meta-analysis which typically uses the Freeman–Tukey double arcsine transformation (Lin & Xu, 2020). In particular, we used a random intercept logistic regression model with a logit link function for the calculation of pooled prevalence rates (van Den Noortgate & Onghena, 2003). The outcome thus was the prevalence of loneliness (individual proportions) measured as the number of lonely older adults among the sample. A three-level meta-analytic model was used to analyze the data (Assink & Wibbelink, 2016), modeling three sources of variance: sampling variance of the observed prevalence rates (Level 1), the variance between prevalence rates from the same study (Level 2), and variance between studies (Level 3) (Cheung, 2014; Van den Noortgate *et al.*, 2013). Results were back-transformed for easier interpretation.

Second, a multilevel random effects model was used for the moderator analyses to evaluate the impact of the measurement scale, the mode of data collection, and the country where a study was conducted on loneliness prevalence: the F-distribution was utilized to determine whether the pooled prevalence of loneliness was significantly affected by the moderators. Two separate one-tailed log-likelihood-ratio tests were conducted, comparing the deviance of the full model to the deviance of a model that excluded one of the variance parameters, to determine whether respectively the variance between prevalence rates within studies (Level 2) and the variance between studies (Level 3) was significant. All model parameters were estimated using the maximum likelihood estimation method. We considered p-values < 0.05 as statistically significant. The statistical analyses were carried out using the dmetar and metafor-packages (Viechtbauer, 2010) in R (version 4.2.1).

To look at the effect of country, we used the six dimensions of Hofstede (Hofstede, 2011), i.e., the Power Distance Index, Individualism, Motivation towards Achievement and Success, the Uncertainty Avoidance Index, Long-Term Orientation, and Indulgence. Despite the fact that there are some critiques on these dimensions now because of the idea of oversimplification and the static nature of cultures that these dimensions entangle (Chun *et al.*, 2021; Minkov, 2018), the Hofstede dimensions were used because they do provide a standardized way to compare cultures and they increase the

awareness and sensitivity to cultural norms (Hofstede Insights, 2023). Moreover, this study is not necessarily about the precise meaning and labeling of the dimensions, but about comparing cultural aspects measured with the same scale in each individual country in the first place.

The Power Distance Index signifies a society's acceptance of hierarchical power distribution – a higher score indicates a greater acceptance of inequality. Second, there is the spectrum of Individualism versus Collectivism, where higher scores suggest weaker interpersonal connections beyond the core "family," and less responsibility for others' actions. The dimension of Motivation towards Achievement and Success is about what motivates people: wanting to be the best (Decisive; high score) or liking what you do (Consensus-oriented; low score). A high score means that the society is driven by achievement, success, and competition, while a low score indicates a society that is driven by quality of life as a sign of success. The Uncertainty Avoidance Index measures a society's inclination to control unpredictability. A higher score indicates a preference for predictability and control in life. Long-Term Orientation versus Short-Term Orientation reflects a society's inclination toward pragmatism, modesty, and thriftiness with higher scores indicating a long-term focus. Finally, Indulgence versus Restraint explores how freely people gratify their desires and emotions – higher scores indicate a more permissive approach to enjoying life and expressing emotions.

Using the Country Comparison Tool of Hofstede (Hofstede Insights, 2023), we obtained a score for every included country for each of these dimensions between 0 and 100. These scores were gathered from survey responses over time, starting between 1967 and 1973 but still going on until today (Hofstede Insights, 2023). The dimension identification happens through factor analysis or other scaling methods, and next, normalization of factor scores is done to fit data from previous studies. The validity comes from correlations with dimensions of previous studies and national indices such as educational achievement or crime rates (Hofstede Insights, 2023).

We centered the continuous scores around the grand mean and used a multilevel approach, in which effect sizes are nested within studies (van Den Noortgate & Onghena, 2003) and which enables using all effect sizes in the primary studies so that maximum statistical power is achieved (Assink *et al.*, 2015).

The protocol of this review was registered at the International Prospective Register of Systematic Reviews (PROSPERO) (registration number: CRD 42021230197).

Results

The initial search provided 2,021 studies. After removing 925 duplicates and screening the other 1,096 records, 512 records were excluded based on title ($n = 251$) and abstract ($n = 261$); 568 records were assessed for eligibility (16 records could not be retrieved), 523 records were eventually excluded (based on language ($n = 30$), target group ($n = 110$) and the lack of a prevalence percentage ($n = 383$)), and 45 studies were included. After the backward and forward snowball search, 17 studies were added. Ultimately, 62 studies were included in the systematic review and 45 in the meta-analysis (17 studies were excluded due to quality appraisal and double data). The Prisma flowchart is added as Figure 1. In 33 studies (Anil *et al.*, 2016; Bao *et al.*, 2021; Carrasco *et al.*, 2021; Chokkanathan, 2020; Dahlberg *et al.*, 2015; Fokkema *et al.*, 2012; Gao *et al.*, 2021; Groarke *et al.*, 2020; Hansen & Slagsvold, 2016; Huang *et al.*, 2021; Igbokwe *et al.*, 2020; Lay-Yee *et al.*, 2021; Nicolaisen & Thorsen, 2014; O'Shea *et al.*, 2021; Paúl *et al.*, 2006; Paúl & Ribeiro, 2009; Peltzer & Pengpid, 2020; Perissinotto *et al.*, 2012; Phaswana-Mafuya & Peltzer, 2017; Rantakokko *et al.*, 2014; Rapolienė & Aartsen, 2021; Routasalo *et al.*, 2006; Srivastava *et al.*, 2020; Stickley *et al.*, 2013; Theeke, 2010; Tomstad *et al.*, 2017; Vozikaki *et al.*, 2018; Yang & Victor, 2008, 2011; Zebhauser *et al.*, 2014; Zhang *et al.*, 2018; van den Broek, 2017; van Tilburg, 2021), the answer to the loneliness question to obtain the prevalence percentages was dichotomized (yes vs. no), while 29 studies (Öztürk Haney *et al.*, 2017; Cheng *et al.*, 2015; Djukanović *et al.*, 2015; Gibney *et al.*, 2017; Holmén *et al.*, 1992; Kearns *et al.*, 2015; La Grow *et al.*, 2012; Losada *et al.*, 2012; Savikko *et al.*, 2005; Steed *et al.*, 2007; Stickley *et al.*, 2015; Sundström *et al.*, 2009; Victor *et al.*, 2005, 2006; Victor & Yang, 2012; Victor & Bowling, 2012; Wang *et al.*, 2001, 2011; Susheela *et al.*, 2018; Chow *et al.*, 2021; Clark *et al.*, 2021; Dahlberg *et al.*, 2018; Devkota *et al.*, 2019; Ho *et al.*, 2021; Jia & Yuan, 2020; Joseph *et al.*, 2020; Lee, 2020; Li & Wang, 2020; Torres *et al.*, 2021) originally distinguished between different loneliness categories (e.g., never vs. seldom vs. sometimes vs. often lonely, etc.).

In our systematic review, most prevalence data ($k = 125$, 70.6%) spanned from 2006 to 2015, and a majority ($k = 127$, 71.8%) came from European countries. The majority of the data collection was done face-to-face ($k = 114$, 64.4%), and through single-item questions ($k = 139$, 78.5%). Table 1 shows an overview of the study characteristics of the included studies in both the systematic review and meta-analysis. Table S1 specifically shows an overview of the study characteristics related to the loneliness prevalence found in the studies. While we included 62 studies in our systematic review, several studies included prevalence percentages of different countries, with corresponding differences in, e.g., sample size and percentage of women (compared with men), leading to separate prevalence rates designated as "k" ($k = 177$ for the systematic review and $k = 101$ for the meta-analysis). Appendix 4 (published as supplementary material online attached to the electronic version of this paper at https://www.cambridge.org/core/journals/international-psychogeriatrics) gives an overview of the study characteristics per study.
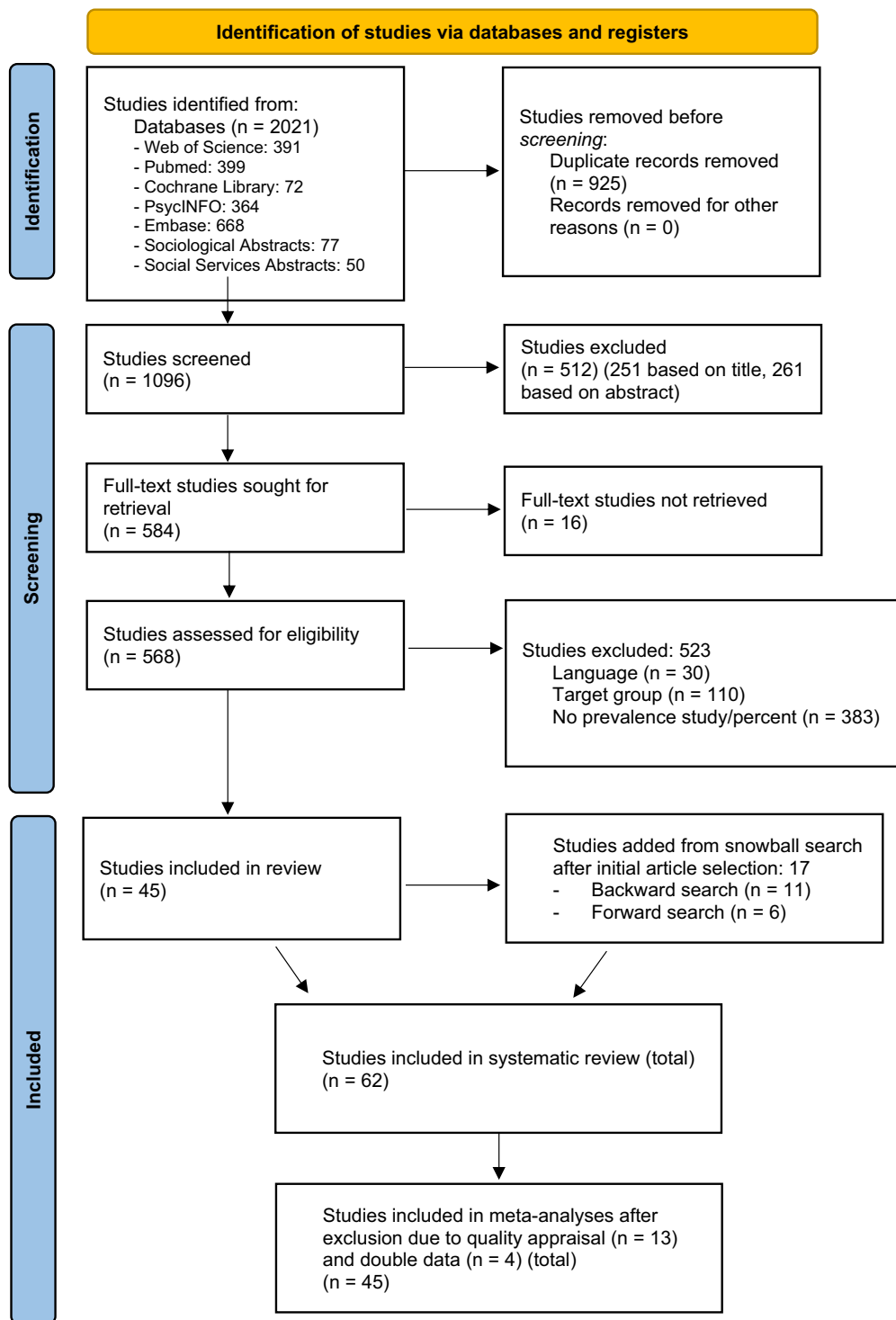
Calculation of the pooled prevalence of loneliness

A total of 45 studies were included in the meta-analysis reporting on $n = 168\ 473$ participants with valid prevalence percentages; $n = 107\ 267$ using single-item questions, $n = 9795$ using the UCLA 20-item scale, $n = 13\ 668$ using a shortened version of the UCLA scale, $n = 37,\ 339$ using the De Jong Gierveld (DJG) scale and $n = 404$ using a combination of different measures. Within these 45 studies, a total of 101 prevalence percentages were extracted. Descriptive information on the demographic and methodological characteristics is summarized in Table 1. The median of the included prevalence percentages was 26.0% (IQR 14.0% to 45.0%). Appendix 5 (published as supplementary material online attached to the electronic version of this paper at https://www.cambridge.org/core/journals/international-psychogeriatrics) presents four forest plots showing the prevalences of all the included studies in the meta-analysis, for each measurement instrument separately.

Table 2 presents the estimated pooled prevalence of loneliness among community-dwelling older adults based on the random-effects model. The pooled prevalence was 31.6% (95% CI 24.4–39.9) and it was statistically significant ($p < .001$). The results of the likelihood-ratio test showed there was significant within-study variance (at level 2, $X^2_{(1)} = 57.06$, $p < .001$) as well as significant between-study variance (at level 3, $X^2_{(1)} = 6221.89$, $p < .001$). From Table 2, 0.23% of the total variance could be attributed to variance at level 1 (i.e., sampling error variance), 28.03% of the total variance to differences between the prevalence of loneliness within studies at level 2 (i.e., within-study variance) and 71.74% of the total variance could be attributed to differences between studies at level 3 (i.e., between-study variance).

Moderator analysis

We performed moderator analyses to assess the effect of measurement instruments, the mode of

Identification of studies via databases and registers

Identification

Studies identified from:
  Databases (n = 2021)
  - Web of Science: 391
  - Pubmed: 399
  - Cochrane Library: 72
  - PsycINFO: 364
  - Embase: 668
  - Sociological Abstracts: 77
  - Social Services Abstracts: 50

→ Studies removed before *screening*:
  Duplicate records removed (n = 925)
  Records removed for other reasons (n = 0)

Screening

Studies screened (n = 1096)

→ Studies excluded (n = 512) (251 based on title, 261 based on abstract)

Full-text studies sought for retrieval (n = 584)

→ Full-text studies not retrieved (n = 16)

Studies assessed for eligibility (n = 568)

→ Studies excluded: 523
  Language (n = 30)
  Target group (n = 110)
  No prevalence study/percent (n = 383)

Included

Studies included in review (n = 45)

→ Studies added from snowball search after initial article selection: 17
  - Backward search (n = 11)
  - Forward search (n = 6)

Studies included in systematic review (total) (n = 62)

Studies included in meta-analyses after exclusion due to quality appraisal (n = 13) and double data (n = 4) (total) (n = 45)

Figure 1. PRISMA flowchart of the included studies.

data collection, and the country where the study was conducted on the pooled loneliness prevalence. The results of all univariate moderator analyses are presented in Table 3.

Measurement instrument was a statistically significant moderator of the overall prevalence of loneliness (F (3, 96) = 11.03, $p < .001$). A significantly lower pooled prevalence of 21.2% (95% CI 15.7–27.9) ($p < .001$) was observed for loneliness prevalence measured using 1-item questions, compared to the 20-item UCLA loneliness scale reporting the highest pooled prevalence of 59.3% (95% CI 43.9–73.0). For the De Jong Gierveld loneliness scale, the pooled prevalence was 55.4% (95% CI 38.6–71.1) which was significantly different from 1-item questions ($p < .001$). The variance

Table 1. Summary of the research characteristics

CHARACTERISTICS	SYSTEMATIC REVIEW ($N = 62$) ($K = 177$) K (%)	META-ANALYSIS ($N = 45$) ($K = 101$) K (%)
Year of publication		
Until 2005	4 (2.3%)	3 (3.0%)
2006–2010	22 (12.4%)	18 (17.8%)
2011–2015	63 (35.6%)	45 (44.6%)
2016–2021	88 (49.7%)	35 (34.7%)
Year of data collection		
Until 2005	24 (13.6%)	7 (7.0%)
2006–2010	76 (42.9%)	52 (51.5%)
2011–2015	49 (27.7%)	20 (19.8%)
2016–2021	14 (7.9%)	11 (10.9%)
Info missing	14 (7.9%)	11 (10.9%)
Research conducted pre- or during COVID?		
Before March 2020	170 (96.0%)	96 (95.0%)
After March 2020	7 (4.0%)	5 (5.0%)
Sample size (of loneliness measure)		
<500	63 (35.6%)	39 (38.6%)
501–1000	50 (28.2%)	28 (27.7%)
1001–5000	42 (23.7%)	27 (26.7%)
>5000	10 (5.6%)	7 (6.9%)
Info missing	12 (6.8%)	0
Percentage of women		
<45%	1 (0.6%)	1 (1.0%)
45–55%	42 (23.7%)	33 (32.7%)
>55%	42 (23.7%)	21 (20.8%)
Info missing	92 (52.0%)	46 (45.5%)
Type of sample		
Random	149 (84.2%)	83 (82.2%)
Not random	13 (7.3%)	12 (11.9%)
Info missing	15 (8.5%)	6 (5.9%)
Region (based on division UN [United Nations, 2021])		
Africa	2 (1.1%)	2 (2.0%)
Americas	12 (6.8%)	5 (5.0%)
Central Asia	2 (1.1%)	2 (2.0%)
Eastern Asia	13 (7.3%)	10 (9.9%)
Southern Asia	7 (4.0%)	5 (5.0%)
Western Asia	9 (5.1%)	7 (6.9%)
Eastern Europe	27 (15.3%)	17 (16.8%)
Northern Europe	45 (25.4%)	25 (24.8%)
Southern Europe	21 (11.9%)	7 (6.9%)
Western Europe	34 (19.2%)	17 (16.8%)
Oceania	5 (2.8%)	4 (4.0%)
Level on which the research was conducted		
National	145 (81.9%)	80 (79.2%)
Regional	32 (18.1%)	21 (20.8%)
Mode of data collection		
Face-to-face	114 (64.4%)	71 (70.3%)
Computer Assisted Personal Interviews (CAPI)	38 (21.5%)	12 (11.9%)
Telephone + Computer-Assisted Telephone Interviews (CATI)	6 (3.4%)	4 (4.0%)
Self-report (postal, written, online/digital)	18 (10.2%)	13 (12.9%)
Combination	1 (0.6%)	1 (1.0%)
Data source		
Own data collection	30 (16.9%)	25 (24.8%)
Use of existing data	147 (83.1%)	76 (75.2%)

Table 1. Continued

CHARACTERISTICS	SYSTEMATIC REVIEW ($N = 62$) ($K = 177$)	META-ANALYSIS ($N = 45$) ($K = 101$)
	K (%)	K (%)
Measurement instrument		
Single-item question	139 (78.5%)	66 (65.3%)
UCLA loneliness scale	19 (10.7%)	18 (17.8%)
20-item UCLA	10 (5.6%)	9 (8.9%)
Shortened UCLA (12-, 8-, 4-, 3-item)	9 (5.1%)	9 (8.9%)
De Jong Gierveld (DJG) loneliness scale	18 (10.2%)	16 (15.8%)
11-item DJG	3 (1.7%)	2 (2.0%)
6-item DJG	15 (8.5%)	14 (13.9%)
Combination of different measures	1 (0.6%)	1 (1.0%)
	MEAN (SD)	MEAN (SD)
Hofstede's dimensions (0–100)		
Power Distance Index	53.16 (22.72)	55.02 (23.34)
Individualism	56.40 (21.95)	54.29 (22.80)
Motivation towards Achievement and Success	47.40 (22.72)	45.30 (22.25)
Uncertainty Avoidance Index	63.23 (23.89)	62.54 (24.00)
Long-Term Orientation	55.94 (20.87)	57.13 (20.59)
Indulgence	48.01 (21.48)	45.96 (21.80)

n, number of studies (i.e., scientific articles) included; k, number of prevalence rates (separated by country) mentioned throughout the studies.

Table 2. Results for the overall pooled prevalence percentage

	# STUDIES	# PREVALENCE RATES	POOLED PREVALENCE (%)	95% CI	P-VALUE	% VAR AT LEVEL 1	LEVEL 2 VARIANCE	% VAR AT LEVEL 2	LEVEL 3 VARIANCE	% VAR AT LEVEL 3
Overall	45	101	31.6	24.4; 39.9	**< 0.001**	0.23	0.426	28.03	1.091	71.74

between studies (level 3) decreased by 63% from 1.091 to 0.400 after adjusting for measurement instrument as moderator.

We also found moderating effects of the mode of data collection on the overall pooled prevalence (F (3, 96) = 3.23, p = .008). This implied there were significant differences between the pooled prevalence from the four data collection methods. The loneliness prevalence for face-to-face data collection was 39.4% (95% CI 30.0–49.6), being significantly higher than telephone and CATI (14.6% [95% CI 6.3–30.4]) and self-report (19.2% [95% CI 10.5–32.6]). However, this moderator explained the variability between studies only modestly as the level 3 variance decreased by only 8% (from 1.091 to 1.002).

Regarding the effect of country, four of the six dimensions of Hofstede were significant (p < .001). The prevalence of loneliness among community-dwelling older adults was significantly higher (compared to the initial 31.6% we found) in a country with the mean score of our sample on the Power Distance Index (32.5% [95% CI 25.5–40.4]), the Uncertainty Avoidance Index (35.9% (95% CI 27.4–45.4)) and the Indulgence index (34.0% [95% CI 26.9–41.9]). Countries with a mean score of our sample on the Individualism index had a significantly lower pooled prevalence of loneliness (30.6 [95% CI 23.8–38.4]). The dimension of Long-Term Orientation was not significant (p = .073), as well as the dimension of Motivation towards Achievement and Success (p = .152).

To check for residual heterogeneity, which is the remaining variability between the studies not accounted for by the moderators, we fitted a model with all the significant moderator variables. After adjusting for these variables, 0.34% of the total variance was attributed to the sampling error variance (level 1), 15.97% to differences within studies (level 2); and 83.69% of the total variance could be attributed to differences between studies (level 3).

Table 3. Results for univariate moderator analysis

MODERATOR VARIABLES	POOLED PREVALENCE (%)	95% CI	F (DF1, DF2)	P-VALUE	LEVEL 2 VARIANCE	LEVEL 3 VARIANCE
Measurement instrument			*F (3, 96) = 11.03*	**<0.001**	*0.460*	*0.400*
Single-item questions	21.2	(15.7; 27.9)		<0.001		
20-item UCLA	59.3	(43.9; 73.0)		<0.001		
Shortened UCLA	25.0	(15.1; 38.5)		0.556		
De Jong Gierveld (DJG)	55.4	(38.6; 71.1)		<0.001		
Mode of data collection			*F (3, 96) = 3.23*	**0.008**	*0.377*	*1.002*
Face-to-face	39.4	(30.0; 49.6)		**0.043**		
Telephone + CATI	14.6	(6.3; 30.4)		**0.006**		
Self-report + Online	19.2	(10.5; 32.6)		**0.017**		
CAPI	39.8	(8.1; 83.3)		0.987		
Power Distance Index (low → high)	32.5	(25.5; 40.4)	*F (1, 97) = 31.75*	**<0.001**	*0.293*	*1.054*
Collectivism → Individualism	30.6	(23.8; 38.4)	*F (1, 97) = 39.36*	**<0.001**	*0.262*	*1.105*
Consensus-oriented → Decisive	31.6	(24.5; 39.7)	*F (1, 97) = 2.08*	0.152	*0.435*	*1.042*
Uncertainty Avoidance Index (low → high)	35.9	(27.4; 45.4)	*F (1, 97) = 19.5*	**<0.001**	*0.298*	*1.433*
Short-Term → Long-Term Orientation	32.0	(24.8; 40.2)	*F (1, 97) = 3.29*	0.073	*0.434*	*1.025*
Restraint → Indulgence	34.0	(26.9; 41.9)	*F (1, 97) = 70.97*	**<0.001**	*0.198*	*1.065*

Discussion

This systematic review and meta-analysis reports on the prevalence of community-dwelling older adults, as well as the impact of the used measurement instrument, mode of data collection, and country on reported prevalence percentages. Using 101 prevalence percentages from 45 studies, our study demonstrates that the pooled prevalence of loneliness among community-dwelling older adults is 31.6%. This percentage corresponds greatly to the percentage of a previous systematic review and meta-analysis on the prevalence of loneliness among older people in high-income countries (not explicitly community-dwelling), which was 28.5% (Chawla et al., 2021). Our results show that the (level 3) variance of pooled loneliness prevalence that can be explained was 63% by differences in the used measurement instrument and 8% by data collection method.

The prevalence of loneliness is lower for single-item questions (21.2%) and shortened UCLA scales (25.0%), compared to the 20-item UCLA (59.3%) and the De Jong Gierveld loneliness scale (55.4%), where the loneliness rates are significantly higher. This might be a result of the fact that single-item questions, and by extension short measurement scales, may be more vulnerable to certain biases in interpretation and meaning as well as on social desirability, and that multiple-item scales are more prone to cover the whole range of a complex construct, such as, in this case, loneliness

(Hoeppner et al., 2011). Looking at the used measurement instruments, single-item questions are indeed more often used despite the existence of validated instruments and despite the critiques on single-item questions mentioning that these cannot capture a construct in all its complexity (Mund et al., 2022).

For the mode of data collection, loneliness prevalence rates vary from 14.6% for telephone interviews (including CATI) to 39.8% for CAPI. A study specifically about the De Jong Gierveld loneliness scale suggests that data collection procedures indeed can have an impact on the motivation, accuracy, and self-disclosure of the participants while being subject to the data collection (van Tilburg & de Leeuw, 1991), and this is thus also visible in our review.

Regarding the country, four of the six dimensions of Hofstede (Hofstede, 2011) caused a significant increase (Power Distance Index, Uncertainty Avoidance Index, Indulgence) or a decrease (Individualism) in loneliness prevalence. Also here, we see that country, and more broadly, culture (Jylhä & Jokela, 1990), should be taken into account when making statements about loneliness prevalence among community-dwelling older adults.

The main strengths of this study are that the search strategy and the analyses were thoughtfully carried out and the choice of prevalence studies specifically on community-dwelling older people was made consciously, as we assessed the risk of bias very thoughtfully through our selection process.

Moreover, despite the high heterogeneity of our pooled prevalence percentages, we assessed the quality of our studies carefully utilizing the JBI Critical Appraisal checklist (Munn *et al.*, 2020), so that a high quality of the included studies and their data collection methods and measures was ensured.

However, results from this study should also be viewed with caution in light of its limitations. First, although a comprehensive search is seen as a potential mechanism for minimizing bias (Cooper *et al.*, 2018), our selection criteria were rather strict. It is possible that because of this, certain percentages were excluded while they would have been included if the criteria were less rigorous. Another limitation is that the field of loneliness research is a rapidly evolving research area, certainly as a result of the COVID pandemic (Lampraki *et al.*, 2022). This means that we could have missed certain studies published since our search was conducted. Third, not all world regions were equally represented in our study: in our systematic review, a low number of prevalence percentages obtained in Africa ($k = 2$) and Oceania ($k = 5$) were included, mainly due to the lack of loneliness prevalence studies from these regions, in contrast to prevalence percentages originating in Europe ($k = 127$) or Asia ($k = 31$). To capture the diversity in the included countries, however, we used Hofstede's dimensions (Hofstede, 2011). Although we were aware of the prevailing criticisms surrounding this model (Chun *et al.*, 2021; Minkov, 2018), the standardized scores and the possibility of comparing countries were decisive to incorporate them in this study. Fourth, we split the UCLA scale into two groups in our analyses (i.e., the original and the shortened scale separately), but this was not done for the DJG due to an insufficient number of prevalence percentages in the two subcategories (i.e., the original vs. the shortened version) to be allowed to conduct separate statistical analyses. Possibly, more studies with the 11-item DJG could provide additional information on the differences between the original and the abbreviated scale. Furthermore, in our meta-analysis, we could not include several possible moderators because they were not consistently mentioned, such as the year of data collection ($k = 11$) or the percentage of men or women ($k = 46$), or because the sample size was relatively small (only $k = 34$ had a sample size of > 1000). Also, age was not included as a moderator because information on age in the studies was incomplete or too heterogeneous. For example, in some studies, the age classes of 60–69, 70–79, and 80 + were used, while 60–74 and 75 + were used in other studies. In addition, numerous studies simply give little or no information on age: several mention a general age range of their participants (e.g., 60–85), but there was no further information on the difference in loneliness prevalence for different ages or age groups.

Future prevalence studies are therefore recommended to comprehensively capture participants' characteristics, including potential loneliness risk factors such as education, marital status, percentage of people living alone, etc., which were frequently absent in the current studies. Additionally, while existing studies differentiate types of loneliness (social, emotional, and existential), specific prevalence percentages for these types of loneliness are often lacking.

This study reviewed the prevalence of loneliness among community-dwelling older adults. Our results show that measurement instruments, mode of data collection, and country acted as moderator variables, leading to varying loneliness prevalence percentages. Nevertheless, considerable variation within and between studies suggests the influence of other factors, such as participant age and gender. Future prevalence studies should consider the contextual impact, including respondents' personal and cultural characteristics, as well as study design, on reported loneliness prevalence rates.

Supplementary material

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S1041610224000425.

Data availability

The extracted data that support the findings of this study are available upon reasonable request of researchers to the corresponding author (HS; hannelore.stegen@vub.be). The study protocol has been published on PROSPERO, https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=230197.

Conflict of interest

None.

Funding

Description of author(s)' roles

HS, DD, LDD, and ED conceived the study. HS, HC, and DD were involved in the data selection process, and DD conducted the critical appraisal together with HS. PS ran the statistical analyses, with the support of LS, and discussed them regularly with HS. HP and MA read the paper thoroughly and provided additional valuable comments. All authors had an important advisory voice in the paper writing process and provided critical comments on the manuscript.

References

Anil, R., Prasad, K., & Puttaswamy, M. (2016). The prevalence of loneliness and its determinants among geriatric population in Bengaluru City, Karnataka, India. *International Journal of Community Medicine and Public Health*, doi, 3246–3251. https://doi.org/10.18203/2394-6040.ijcmph20163944,

Assink, M., Van Der Put, C. E., Hoeve, M., De Vries, S. L. A., Stams, G. J. J. M., & Oort, F. J. (2015). Risk factors for persistent delinquent behavior among juveniles: A meta-analytic review. *Clinical Psychology Review*, 42, 47–61. https://doi.org/10.1016/j.cpr.2015.08.002

Assink, M., & Wibbelink, C. J. M. (2016). Fitting three-level meta-analytic models in R: A step-by-step tutorial. *The Quantitative Methods for Psychology*, 12(3), 154–174. https://doi.org/10.20982/tqmp.12.3.p154

Awad, R., Shamay-Tsoory, S. G., & Palgi, Y. (2023). Fluctuations in loneliness due to changes in frequency of social interactions among older adults: A weekly based diary study. *International Psychogeriatrics*, 35(6), 293–303. https://doi.org/10.1017/S1041610223000133

Bao, L., Li, W.-T., & Zhong, B.-L. (2021). Feelings of loneliness and mental health needs and services utilization among Chinese residents during the COVID-19 epidemic. *Globalization and Health*, 17(1), 51. https://doi.org/10.1186/s12992-021-00704-5

Boyle, M. H. (1998). Guidelines for evaluating prevalence studies. *Evidence-Based Mental Health*, 1(2), 37–39. https://doi.org/10.1136/ebmh.1.2.37

Carrasco, M., Fernández, Mb, Alexander, E., & Herrera, Ms (2021). Loneliness in older Chilean people: Importance of family dysfunction and depression. *International Journal of Mental Health Promotion*, 23(1), 99–109. https://doi.org/10.32604/IJMHP.2021.011568

Chawla, K., Kunonga, T. P., Stow, D., Barker, R., Craig, D., Hanratty, B., & Aslam, M. S. (2021). Prevalence of loneliness amongst older people in high-income countries: A systematic review and meta-analysis. *PLOS ONE*, 16(7), e0255088. https://doi.org/10.1371/journal.pone.0255088

Cheng, P., Jin, Y., Sun, H., Tang, Z., Zhang, C., Chen, Y., Zhang, Q., Zhang, Q., & Huang, F. (2015). Disparities in prevalence and risk indicators of loneliness between rural empty nest and non-empty nest older adults in Chizhou, China: Loneliness in empty nest rural elderly.

Geriatrics & Gerontology International, 15(3), 356–364. https://doi.org/10.1111/ggi.12277

Cheung, M. W.-L. (2014). Modeling dependent effect sizes with three-level meta-analyses: A structural equation modeling approach. *Psychological Methods*, 19(2), 211–229. https://doi.org/10.1037/a0032968

Chokkanathan, S. (2020). Prevalence of and risk factors for loneliness in rural older adults. *Australasian Journal on Ageing*, 39(4), e545–e551. https://doi.org/10.1111/ajag.12835

Chow, S. K. Y., Wong, F. M. F., & Choi, E. K. Y. (2021). Loneliness in old age, the related factors, and its association with demographics and districts of residence. *International Journal of Environmental Research and Public Health*, 18(17), 9398. https://doi.org/10.3390/ijerph18179398

Chun, D., Zhang, Z., Cohen, E., Florea, L., & Genc, O. F. (2021). Long-term orientation and the passage of time: Is it time to revisit Hofstede's cultural dimensions? *International Journal of Cross Cultural Management*, 21(2), 353–371. https://doi.org/10.1177/14705958211026342

Clark, M., Bonnici, J., & Azzopardi, A. (2021). Loneliness in Malta: Findings from the first national prevalence study. *Journal of Social and Personal Relationships*, 38(9), 2751–2771. https://doi.org/10.1177/02654075211020120

Compernolle, E. L., Finch, L. E., Hawkley, L. C., & Cagney, K. A. (2021). Momentary loneliness among older adults: Contextual differences and their moderation by gender and race/ethnicity. *Social Science & Medicine*, 285, 114307. https://doi.org/10.1016/j.socscimed.2021.114307

Cooper, C., Booth, A., Varley-Campbell, J., Britten, N., & Garside, R. (2018). Defining the process to literature searching in systematic reviews: A literature review of guidance and supporting studies. *BMC Medical Research Methodology*, 18(1), 85. https://doi.org/10.1186/s12874-018-0545-3

Dahlberg, L., Agahi, N., & Lennartsson, C. (2018). Lonelier than ever? Loneliness of older people over two decades. *Archives of Gerontology and Geriatrics*, 75, 96–103. https://doi.org/10.1016/j.archger.2017.11.004

Dahlberg, L., Andersson, L., McKee, K. J., & Lennartsson, C. (2015). Predictors of loneliness among older women and men in Sweden: A national longitudinal study. *Aging & Mental Health*, 19(5), 409–417. https://doi.org/10.1080/13607863.2014.944091

de Jong Gierveld, J. (1987). Developing and testing a model of loneliness. *Journal of Personality and Social Psychology*, 53(1), 119–128. https://doi.org/10.1037/0022-3514.53.1.119

De Jong Gierveld, J., & van Tilburg, T. (1999). *Manual of the loneliness scale*. Department of Social Research Methodology, Vrije Universiteit Amsterdam.

De Jong Gierveld, J., van Tilburg, T., & Dykstra, P. A. (2006). Loneliness and social Isolation. In A. L. Vangelisti, & D. Perlman (Ed.), *The Cambridge handbook of personal relationships* (pp. 485–500). Cambridge University Press.

Devkota, R., Mishra, K., & Shrestha, S. (2019). Loneliness and depression among older people living in a community of Nepal. *Journal of Nepal Health Research Council*, 17(2), 185–192. https://doi.org/10.33314/jnhrc.v0i0.1561

Djukanović, I., Sorjonen, K., & Peterson, U. (2015). Association between depressive symptoms and age, sex, loneliness and treatment among older people in Sweden. *Aging & Mental Health*, 19(6), 560–568. https://doi.org/10.1080/13607863.2014.962001

Elovainio, M., Hakulinen, C., Pulkki-Råback, L., Virtanen, M., Josefsson, K., Jokela, M., Vahtera, J., & Kivimäki, M. (2017). Contribution of risk factors to excess mortality in isolated and lonely individuals: An analysis of data from the UK biobank cohort study. *The Lancet Public Health*, 2(6), e260–e266. https://doi.org/10.1016/S2468-2667(17)30075-0

Fokkema, T., De Jong Gierveld, J., & Dykstra, P. A. (2012). Cross-national differences in older adult loneliness. *The Journal of Psychology*, 146(1-2), 201–228. https://doi.org/10.1080/00223980.2011.631612

Gao, Q., Prina, A. M., Prince, M., Acosta, D., Luisa Sosa, A., Guerra, M., Huang, Y., Jimenez-Velazquez, I. Z., Llibre Rodriguez, J. J., Salas, A., Williams, J. D., Liu, Z., Acosta Castillo, I., & Mayston, R. (2021). Loneliness among older adults in Latin America, China, and India: Prevalence, correlates and association with mortality. *International Journal of Public Health*, 66, 604449. https://doi.org/10.3389/ijph.2021.604449

Gibney, S., Delaney, L., Codd, M., & Fahey, T. (2017). Lifetime childlessness, depressive mood and quality of life among older Europeans. *Social Indicators Research*, 130(1), 305–323. https://doi.org/10.1007/s11205-015-1177-1

Groarke, J. M., Berry, E., Graham-Wisener, L., McKenna-Plumley, P. E., McGlinchey, E., Armour, C., & Murakami, M. (2020). Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 psychological wellbeing study. *PLOS ONE*, 15(9), e0239698. https://doi.org/10.1371/journal.pone.0239698

Hansen, T., & Slagsvold, B. (2016). Late-life loneliness in 11 European countries: Results from the generations and gender survey. *Social Indicators Research*, 129(1), 445–464. https://doi.org/10.1007/s11205-015-1111-6

Hofstede Insights (2023). https://www.hofstede-insights.com/country-comparison-tool. Accessed January 2, 2024.

Ho, K. H. M., Cheung, D. S. K., Lee, P. H., Lam, S. C., & Kwan, R. Y. C. (2021). Co-living with migrant domestic workers is associated with a lower level of loneliness among community-dwelling older adults: A cross-sectional study. *Health & Social Care in the Community*, 30(4), e1123–e1133.

Hoeppner, B. B., Kelly, J. F., Urbanoski, K. A., & Slaymaker, V. (2011). Comparative utility of a single-item versus multiple-item measure of self-efficacy in predicting relapse among young adults. *Journal of Substance Abuse Treatment*, 41(3), 305–312. https://doi.org/10.1016/j.jsat.2011.04.005

Hofstede, G. (2011). Dimensionalizing cultures: The Hofstede model in context. *Online Readings in Psychology and Culture*, 2(1), 1–6. https://doi.org/10.9707/2307-0919.1014

Holmén, K., Ericsson, K., Andersson, L., & Winblad, B. (1992). Loneliness among elderly people living in Stockholm: A population study. *Journal of Advanced Nursing*, 17(1), 43–51. https://doi.org/10.1111/j.1365-2648.1992.tb01817.x

Huang, P.-H., Chi, M.-J., Kuo, C.-L., Wu, S.-F. V., & Chuang, Y.-H. (2021). Prevalence of loneliness and related factors among older adults in Taiwan: Evidence from a nationally representative survey. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, 58, 004695802110357. https://doi.org/10.1177/00469580211035745

Igbokwe, C. C., Ejeh, V. J., Agbaje, O. S., Umoke, P. I. C., Iweama, C. N., & Ozoemena, E. L. (2020). Prevalence of loneliness and association with depressive and anxiety symptoms among retirees in Northcentral Nigeria: A cross-sectional study. *BMC Geriatrics*, 20(1), 153. https://doi.org/10.1186/s12877-020-01561-4

Jia, G., & Yuan, P. (2020). The association between sleep quality and loneliness in rural older individuals: a cross-sectional study in Shandong Province, China. *BMC Geriatrics*, 20(1), 180. https://doi.org/10.1186/s12877-020-01554-3

Joseph, L., Nalini, S., & Santhi, V. (2020). Prevalence of loneliness and depression among elderly in South India. *Indian Journal of Public Health Research & Development*, 11(11), 361–366. https://doi.org/10.37506/ijphrd.v11i11.11402

Jylhä, M., & Jokela, J. (1990). Individual experiences as cultural – a cross-cultural study on loneliness among the elderly. *Ageing and Society*, 10(3), 295–315. https://doi.org/10.1017/S0144686X00008308

Kearns, A., Whitley, E., Tannahill, C., & Ellaway, A. (2015). Loneliness, social relations and health and well-being in deprived communities. *Psychology, Health & Medicine*, 20(3), 332–344. https://doi.org/10.1080/13548506.2014.940354

La Grow, S., Neville, S., Alpass, F., & Rodgers, V. (2012). Loneliness and self-reported health among older persons in New Zealand: Loneliness and self-reported health. *Australasian Journal on Ageing*, 31(2), 121–123. https://doi.org/10.1111/j.1741-6612.2011.00568.x

Lampraki, C., Hoffman, A., Roquet, A., & Jopp, D. S. (2022). Loneliness during COVID-19: Development and influencing factors. *PLOS ONE*, 17(3), e0265900. https://doi.org/10.1371/journal.pone.0265900

Lay-Yee, R., Campbell, D., & Milne, B. (2022). Social attitudes and activities associated with loneliness: Findings from a New Zealand national survey of the adult population. *Health & Social Care in the Community*, 30(3), 1120–1132.

Lee, S. (2020). Loneliness among older adults in the Czech Republic: A socio-demographic, health, and psychosocial profile. *Archives of Gerontology and Geriatrics*, 90, 104068. https://doi.org/10.1016/j.archger.2020.104068

Li, L. Z., & Wang, S. (2020). Prevalence and predictors of general psychiatric disorders and loneliness during COVID-19 in the United Kingdom. *Psychiatry Research*, 291, 113267. https://doi.org/10.1016/j.psychres.2020.113267

Lin, L., & Xu, C. (2020). Arcsine-based transformations for meta-analysis of proportions: Pros, cons, and alternatives. *Health Science Reports*, 3(3), e178–e183. https://doi.org/10.1002/hsr2.178

Losada, A., Márquez-González, M., García-Ortiz, L., Gómez-Marcos, M. A., Fernández-Fernández, V., & Rodríguez-Sánchez, E. (2012). Loneliness and mental health in a representative sample of community-dwelling

Spanish older adults. *The Journal of Psychology*, 146(3), 277–292. https://doi.org/10.1080/00223980.2011.582523

Mack, C. (2015). How to write a good scientific paper: A reviewer's checklist. *Journal of Micro/Nanolithography, MEMS, and MOEMS*, 14(2), 020101. https://doi.org/10.1117/1.JMM.14.2.020101

Minkov, M. (2018). A revision of Hofstede's model of national culture: Old evidence and new data from 56 countries. *Cross Cultural & Strategic Management*, 25(2), 231–256. https://doi.org/10.1108/CCSM-03-2017-0033

Mund, M., Maes, M., Drewke, P. M., Gutzeit, A., Jaki, I. , & Qualter, P. (2022). Would the real loneliness please stand up? The validity of loneliness scores and the reliability of single-item scores. *Assessment*, 30(4), 1226–1248. https://doi.org/10.1177/10731911221077227

Munn, Z., Barker, T. H., Moola, S., Tufanaru, C., Stern, C., McArthur, A., Stephenson, M., & Aromataris, E. (2020). Methodological quality of case series studies: An introduction to the JBI critical appraisal tool. *JBI Evidence Synthesis*, 18, 2127–2133. https://doi.org/10.11124/JBISRIR-D-19-00099

Nicolaisen, M., & Thorsen, K. (2014). Who are lonely? Loneliness in different age groups (18-81 years old), using two measures of loneliness. *The International Journal of Aging and Human Development*, 78(3), 229–257. https://doi.org/10.2190/AG.78.3.b

O'Shea, B. Q., Finlay, J. M., Kler, J., Joseph, C. A., & Kobayashi, L. C. (2021). Loneliness among US adults aged ≥ 55 early in the COVID-19 pandemic: findings from the COVID-19 coping study. *Public Health Reports*, 136(6), 754–764. https://doi.org/10.1177/00333549211029965

Ost-Mor, S., Segel-Karpas, D., Palgi, Y., Yaira, H.-R., Mayan, S., Ben-Ezra, M., & Greenblatt-Kimron, L. (2023). Let there be light: The moderating role of positive solitude in the relationship between loneliness and depressive symptoms. *International Psychogeriatrics*, 1–5.

Öztürk Haney, M., Bahar, Z., Beşer, A., Açıl, D., Yardımcı, T., & Çömez, S. (2017). Factors related to loneliness among the elderly living at home in Turkey. *Turkish Journal of Family Medicine and Primary Care*, 11(2), 71–78.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., McGuinness, L. A., Stewart, L. A., Thomas, J., Tricco, A. C., Welch, V. A., Whiting, P., & Moher, D. (2021). The PRISMA. 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71.

Paúl, C., Ayis, S., & Ebrahim, S. (2006). Psychological distress, loneliness and disability in old age. *Psychology, Health & Medicine*, 11(2), 221–232. https://doi.org/10.1080/13548500500262945

Paúl, C., & Ribeiro, O. (2009). Predicting loneliness in old people living in the community. *Reviews in Clinical Gerontology*, 19(1), 53–60. https://doi.org/10.1017/S0959259809990074

Peltzer, K., & Pengpid, S. (2020). Prevalence and correlates of loneliness among a nationally representative population-based sample of older adults in Mexico. *International Journal on Disability and Human Development*, 19, 581–587.

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. https://doi.org/10.1001/archinternmed.2012.1993

Perlman, D., & Peplau, L. A. (1981). Toward a social psychology of loneliness. In S. W. Duck, & R. Gilmour (Ed.), *Personal Relationships. 3: Personal relationships in disorder* (pp. 31–56). Academic Press.

Phaswana-Mafuya, N., & Peltzer, K. (2017). Prevalence of loneliness and associated factors among older adults in South Africa. *Global Journal of Health Science*, 9(12), 1. https://doi.org/10.5539/gjhs.v9n12p1

Rantakokko, M., Iwarsson, S., Vahaluoto, S., Portegijs, E., Viljanen, A., & Rantanen, T. (2014). Perceived environmental barriers to outdoor mobility and feelings of loneliness among community-dwelling older people. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 69(12), 1562–1568. https://doi.org/10.1093/gerona/glu069

Rapolienė, G., & Aartsen, M. (2021). Lonely societies: low trust societies? Further explanations for national variations in loneliness among older Europeans. *European Journal of Ageing*, 19(3), 485–494. https://doi.org/10.1007/s10433-021-00649-z

Routasalo, P. E., Savikko, N., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2006). Social contacts and their relationship to loneliness among aged people – a population-based study. *Gerontologia*, 52(3), 181–187. https://doi.org/10.1159/000091828

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

Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, 41(3), 223–233. https://doi.org/10.1016/j.archger.2005.03.002

Srivastava, S., Ramanathan, M., Dhillon, P., Maurya, C., & Singh, S. K. (2020). Gender differentials in prevalence of loneliness among older adults in India: An analysis from WHO study on global AGEing and adult health. *Ageing International*, 46, 395–421.

Steed, L., Boldy, D., Grenade, L., & Iredell, H. (2007). The demographics of loneliness among older people in Perth, Western Australia. *Australasian Journal on Ageing*, 26(2), 81–86. https://doi.org/10.1111/j.1741-6612.2007.00221.x

Steultjens, E. M. J., Dekker, J., Bouter, L. M., Jellema, S., Bakker, E. B., & van den Ende, C. H. M. (2004). Occupational therapy for community dwelling elderly people: A systematic review. *Age and Ageing*, 33(5), 453–460. https://doi.org/10.1093/ageing/afh174

Stickley, A., Koyanagi, A., Leinsalu, M., Ferlander, S., Sabawoon, W., & McKee, M. (2015). Loneliness and

health in Eastern Europe: Findings from Moscow, Russia. *Public Health*, 129(4), 403–410. https://doi.org/10.1016/j .puhe.2014.12.021

Stickley, A., Koyanagi, A., Roberts, B., Richardson, E., Abbott, P., Tumanov, S., McKee, M., & Mendelson, J. E. (2013). Loneliness: Its correlates and association with health behaviours and outcomes in nine countries of the former soviet union. *PLoS ONE*, 8(7), e67978. https://doi.org/10.1371/journal.pone .0067978

Su, Y., Rao, W., Li, M., Caron, G., D'Arcy, C., & Meng, X. (2023). Prevalence of loneliness and social isolation among older adults during the COVID-19 pandemic: A systematic review and meta-analysis. *International Psychogeriatrics*, 35(5), 229–241. https://doi .org/10.1017/S1041610222000199

Sundström, G., Fransson, E., Malmberg, B., & Davey, A. (2009). Loneliness among older Europeans. *European Journal of Ageing*, 6(4), 267–275. https://doi.org/10.1007/ s10433-009-0134-8

Surkalim, D. L., Luo, M., Eres, R., Gebel, K., van Buskirk, J., Bauman, A., & Ding, D. (2022). The prevalence of loneliness across 113 countries: Systematic review and meta-analysis. *BMJ*, 376, e067068. https://doi .org/10.1136/bmj-2021-067068

Susheela, P., Valsaraj, B. P., & Savitha, P. (2018). Depression, perceived loneliness and partial functional impairment among older adults. *Journal Of Clinical And Diagnostic Research*, 12(10), VC01. https://doi.org/10.7860/ JCDR/2018/34086.12096

Switsers, L., Dierckx, E., Domènech-Abella, J., De Donder, L., Dury, S., & the D-SCOPE Consortium (2021). Negative old-age life events and well-being in later life: The moderating and mediating role of loneliness. *International Psychogeriatrics*, 33(12), 1265–1276. https:// doi.org/10.1017/S1041610220004196

Theeke, L. A. (2010). Sociodemographic and health-related risks for loneliness and outcome differences by loneliness status in a sample of U.S. *Older Adults. Research in Gerontological Nursing*, 3(2), 113–125. https://doi.org/10 .3928/19404921-20091103-99

Tomstad, S., Dale, B., Sundsli, K., Saevareid, H. I., & Söderhamn, U. (2017). Who often feels lonely? A cross-sectional study about loneliness and its related factors among older home-dwelling people. *International Journal of Older People Nursing*, 12(4), e12162. https://doi.org/10 .1111/opn.12162

Torres, J. L., Braga, Lde S., Moreira, Bde S., Sabino Castro, C. M., Vaz, C. T., Andrade, A. C.de S., Bof Andrade, F. D.;ola, Lima-Costa, M. F., & Caiaffa, W. T. (2021). Loneliness and social disconnectedness in the time of pandemic period among Brazilians: Evidence from the ELSI COVID-19 initiative. *Aging & Mental Health*, 1-7(5), 898–904. https://doi.org/ 10.1080/13607863.2021.1913479

United Nations (2021) Standard country or area codes for statistical use (M49). https://unstats.un.org/unsd/ methodology/m49/. Accessed May 27, 2022.

van den Broek, T. (2017). Gender differences in the correlates of loneliness among Japanese persons aged 50-70. *Australasian Journal on Ageing*, 36(3), 234–237. https://doi .org/10.1111/ajag.12448

van Den Noortgate, W., & Onghena, P. (2003). Multilevel meta-analysis: A comparison with traditional meta-analytical procedures. *Educational and Psychological Measurement*, 63(5), 765–790. https://doi.org/10.1177/ 0013164402251027

Van den Noortgate, W., López-López, J. A., Marín-Martínez, F., & Sánchez-Meca, J. (2013). Three-level meta-analysis of dependent effect sizes. *Behavior Research Methods*, 45(2), 576–594. https://doi.org/10.3758/s13428-012-0261-6

van Tilburg, T., & de Leeuw, E. (1991). Stability of scale quality under various data collection procedures: A mode comparison on the De Jong gierveld loneliness scale. *International Journal of Public Opinion Research*, 3(1), 69–85. https://doi.org/10.1093/ijpor/3.1.69

van Tilburg, T. G. (2021). Emotional, social, and existential loneliness before and during the COVID-19 pandemic: Prevalence and risk factors among Dutch older adults. *The Journals of Gerontology: Series B*, 77(7), e179–e184. https:// doi.org/10.1093/geronb/gbab101

Victor, C. R., & Bowling, A. (2012). A longitudinal analysis of loneliness among older people in great Britain. *The Journal of Psychology*, 146(3), 313–331. https://doi.org/10 .1080/00223980.2011.609572

Victor, C. R., Scambler, S. J., Bowling, A., & Bond, J. (2005). The prevalence of, and risk factors for, loneliness in later life: A survey of older people in great Britain. *Ageing and Society*, 25(6), 357–375. https://doi.org/10.1017/ S0144686X04003332

Victor, C. R., Scambler, S. J., Marston, L., Bond, J., & Bowling, A. (2006). Older people's experiences of loneliness in the UK: Does gender matter? *Social Policy and Society*, 5(1), 27–38. https://doi.org/10.1017/ S1474746405002733

Victor, C. R., & Yang, K. (2012). The prevalence of loneliness among adults: A case study of the United Kingdom. *The Journal of Psychology*, 146(1-2), 85–104. https://doi.org/10.1080/00223980.2011.613875

Viechtbauer, W. (2010). Conducting meta-analyses in R with the metafor package. *Journal of Statistical Software*, 36(3), 1–48. https://doi.org/10.18637/jss.v036.i03

Vozikaki, M., Papadaki, A., Linardakis, M., & Philalithis, A. (2018). Loneliness among older European adults: Results from the survey of health, aging and retirement in Europe. *Journal of Public Health*, 26(6), 613–624. https://doi.org/10.1007/s10389-018-0916-6

Wang, G., Zhang, X., Wang, K., Li, Y., Shen, Q., Ge, X., & Hang, W. (2011). Loneliness among the rural older people in Anhui, China: Prevalence and associated factors. *International Journal of Geriatric Psychiatry*, 26(11), 1162–1168. https://doi.org/10.1002/gps.2656

Wang, J.-J., Snyder, M., & Kaas, M. (2001). Stress, loneliness, and depression in Taiwanese rural community-dwelling elders. *International Journal of Nursing Studies*, 38(3), 339–347. https://doi.org/10.1016/S0020-7489(00) 00072-9

World Health Organization (2021). *Social isolation and loneliness among older people: advocacy brief*. World Health Organization.

Yang, K., & Victor, C. (2011). Age and loneliness in 25 European nations. *Ageing and Society*, 31(8), 1368–1388. https://doi.org/10.1017/S0144686X1000139X

Yang, K., & Victor, C. R. (2008). The prevalence of and risk factors for loneliness among older people in China. *Ageing and Society*, 28(3), 305–327. https://doi.org/10.1017/S0144686X07006848

Zebhauser, A., Hofmann-Xu, L., Baumert, J., Häfner, S., Lacruz, M. E., Emeny, R. T., Döring, A., Grill, E., Huber, D., Peters, A., & Ladwig, K. H. (2014). How much does it hurt to be lonely? Mental and physical differences between older men and women in the KORA-age study: Gender differences of loneliness in older people. *International Journal of Geriatric Psychiatry*, 29(3), 245–252. https://doi.org/10.1002/gps.3998

Zhang, J., Xu, L., Li, J., Sun, L., Ding, G., Qin, W., Wang, Q., Zhu, J., Yu, Z., & Xie, S. (2018). Loneliness and health service utilization among the rural elderly in Shandong, China: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 15(7), 1468. https://doi.org/10.3390/ijerph15071468