

Loneliness and Health in Older Adults: A Mini-Review and Synthesis

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Abstract

Increasing evidence suggests that perceived social isolation or loneliness is a major risk factor for physical and mental illness in later life. This review assesses the status of research on loneliness and health in older adults. Key concepts and definitions of loneliness are identified, and the prevalence, correlates, and health effects of loneliness in older individuals are reviewed. Theoretical mechanisms that underlie the association between loneliness and health are also described, and illustrative studies examining these mechanisms are summarized. Intervention approaches to reduce loneliness in old age are highlighted, and priority recommendations for future research are presented.

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Extensive research has documented the importance of social relationships for promoting mental health and protecting against the development and progression of physical illness and disease. Integrative reviews of the literature provide consistent evidence that social relationships – both quantity and quality – are a major contributing factor in lowering broad-based morbidity

and mortality [1–3]. By contrast, loneliness or the perceived absence of positive social relationships has been linked to diminished longevity [4], particularly among older individuals in whom declining economic resources, illness, widowhood, and impaired mobility may result in increased risk for social isolation [5].

In this review, we focus on what is known about the relationship between loneliness and health in later adulthood, giving emphasis to the major approaches, empirical findings, and methodological gaps that currently exist in the literature. To this end, we review (a) definitions that distinguish loneliness from related concepts such as living alone, social isolation, and solitude; (b) estimates of the prevalence of loneliness in old age; (c) correlates and health effects of loneliness; (d) potential mechanisms underlying the association between loneliness and health among vulnerable older individuals, and (e) intervention strategies to alleviate loneliness in later life. We close with a discussion of future research directions.

Conceptualization and Measurement of Loneliness

Loneliness is generally understood as the discrepancy between a person's preferred and actual level of social contact [6]. Researchers have distinguished loneliness from related concepts such as living alone, solitude, and social isolation [2, 5, 7]. At its most basic level, *social iso-*

lation has been defined as an objective state of having minimal social contact with other individuals, whereas *loneliness* reflects a subjective state of lacking desired affection and closeness to a significant or intimate other (i.e., emotional loneliness) or to close friends and family (i.e., relational loneliness). Moreover, although sometimes considered synonymous with *living alone*, loneliness and living alone are related but not overlapping categories. For instance, research with older adults demonstrates that living alone is not necessarily indicative of loneliness, with many who live alone reporting frequent social contact and active social involvement in community organizations [8]. Similarly, researchers have distinguished loneliness from the experience of being alone or *solitude*. The latter reflects a state of social isolation that involves a voluntary distancing from one's social network, whereas loneliness is involuntary and more closely associated with deficits in the perceived quality of one's social interactions [2]. In the remainder of this review, we focus on work that defines loneliness as the discrepancy between actual and desired social relationships, a conceptualization that is in keeping with historic formulations of loneliness [6] and accounts for the role of poor quality connections.

Individual differences in loneliness are commonly measured either using single-item, unidimensional scales, or multidimensional approaches. Single-item questions of loneliness – such as those found in longer versions of the Center for Epidemiologic Studies Depression (CES-D) scale, wherein respondents are asked ‘Do you feel lonely?’ – are the most common and widely used measures of loneliness. Although face valid and well-suited for large-scale, population-based studies, the use of single-item direct measures is likely to result in underreporting due to the stigma associated with being identified as lonely [9, 10]. Among the most common and widely used multidimensional scales tapping loneliness are the UCLA Loneliness Scale [11] and the de Jong Gierveld (dJG) Loneliness Scale [12]. Unlike single-item direct measures of loneliness, these scales consist of items that exclude any reference to loneliness.

Items on the UCLA Loneliness Scale assess one's subjective feelings of loneliness (e.g., ‘How often do you feel that there are people who really understand you?’, ‘How often do you feel your relationships with others are not meaningful?’, and ‘How often do you feel that you are no longer close to anyone?’). Conceptualized as a unidimensional construct that varies in frequency and intensity [11], factor analyses of the 20-item UCLA Loneliness Scale have revealed anywhere from two to five dimen-

sions, with second-order factor analyses yielding a single hierarchical loneliness construct. More recently, a shortened 3-item version has been developed for use in large-scale surveys [13].

Widely used in Europe, the dJG Loneliness Scale probes both emotional and social dimensions of loneliness with items such as ‘I experience a general sense of emptiness’, and ‘There are enough people I feel close to’. Whereas emotional loneliness involves the absence of an intimate attachment (partner, sibling, close confidant), social loneliness reflects the absence of a broader community or social network (friends, coworkers, and neighbors). The social loneliness items found in the dJG scale (e.g., ‘There is always someone I can talk to about my day-to-day problems’; ‘There are enough people I feel close to’) have parallels with items from the UCLA scale (e.g., ‘I have nobody to talk to’; ‘I am no longer close to anyone’). Neither scale sets a time frame for responses to items. Finally, although both the UCLA Loneliness Scale and the dJG scale conceptualize loneliness as subjective, they differ in whether they view loneliness primarily as a global, unidimensional construct (UCLA) or as multifaceted phenomenon with separate emotional and social components (dJG). Overall, the available evidence supports the need for further measurement research with older adults that addresses the dimensionality of UCLA and dJG scales.

Prevalence of Loneliness

The prevalence of loneliness among older individuals varies across studies as a function of the (a) measure of loneliness used, (b) populations studied, and (c) age group and sample sizes considered. For example, using a single-item direct question from the 2002 Health and Retirement Study (HRS; $n = 8,932$), Theeke [14] estimated that 19.3% of noninstitutionalized or community-dwelling US adults over the age of 65 years reported feeling lonely for much of the previous week. Similarly, Perissinotto et al. [15], using the 3-item version of the UCLA Loneliness Scale in the HRS [13], reported that 29% of respondents aged 75 years or older were lonely, defined as endorsing one of the loneliness items at least ‘some of the time.’ Finally, comparative data from a survey conducted by the American Association of Retired Persons (AARP; $n = 3,012$) using a national representative sample estimated that 25% of community-dwelling US respondents over the age of 70 years were lonely [16], as measured by a score of 44 or higher on the 20-item UCLA

Loneliness Scale. Overall, despite the heterogeneous nature of the measures, sample sizes, and ages considered in the HRS and AARP surveys, prevalence of loneliness in US older adults are high enough to warrant concern, with estimates ranging between 25 and 29% of American adults aged 70 years and older reporting being lonely.

Similar prevalence estimates have been reported across European countries. For instance, Yang and Victor [17] compared estimates of loneliness in older adults (aged 60 years and older) in 25 European countries ($n = 47,099$). Using a single-item measure of loneliness (i.e., 'How much of the time during the past week did you feel lonely?'), the authors estimated that the prevalence of chronic or frequent loneliness was highest in former Soviet states, including Ukraine (34.0%), Russia (24.4%), Hungary (21.1%), and Poland (20.1%). Likewise, using data from a large Norwegian sample ($n = 14,743$), Nicolaisen and Thorsen [18] estimated that 30.2% of Norwegian adults over the age of 65 years reported being lonely, as measured by a score of 2 or more (answer categories range from 1 = not lonely to 6 = intensely lonely) on the 6-item DJG Loneliness Scale.

Studies conducted in Asia have reported similar prevalence estimates of loneliness in relation to age. In China, for example, a national survey conducted in 2000 ($n = 20,255$) found that 29.6% of older adults (age 60 years and older) reported that they 'often felt lonely' [19]. Other researchers have reported similar prevalence estimates in Mediterranean countries. For instance, Stessman et al. [20] investigated feelings of loneliness among a representative sample of Israeli residents in Jerusalem aged 70 years and older. Using a single global measure of subjective loneliness (i.e., 'How often do you feel lonely?'), the authors estimated that at the age of 70, 78, and 85 years, the prevalence of loneliness was 27.9% ($n = 95$), 23.9% ($n = 124$), and 24% ($n = 169$), respectively.

In sum, the available evidence supports the conclusion that prevalence estimates of loneliness at older ages are high enough to justify intervention; however, estimates vary across studies, reflecting the different measurement approaches and populations sampled.

Correlates and Health Effects of Loneliness

There is a sizeable literature on the risk factors for loneliness in older adults. A meta-analytic synthesis of 218 studies by Pinquart and Sörensen [21] concluded that loneliness was associated with a constellation of sociodemographic, psychosocial, and health-related risk factors

that include being female, widowed, divorced, never married; having little contact with significant friends or low-quality friendship ties; worsening physical health (e.g., increased chronic illness and impaired mobility), and lacking socioeconomic resources (e.g., limited education and low income). More recent large-scale, population-based studies of older adults have reported broadly similar findings [15, 18]. Moreover, these factors have also been previously identified as major risk factors for social isolation among older individuals [5].

At older ages, loneliness is also a major risk factor for broad-based morbidity (both psychological and physical). As summarized by Cacioppo et al. [22], significant aspects of adult morbidity predicted by loneliness include depressive symptomatology, physical health, and functional limitations. Indeed, growing evidence indicates that loneliness is associated with a wide range of health outcomes in later life, even after adjusting for objective indices of social isolation. For example, independent of objective features of social relationships (e.g., living arrangement, number and frequency of contacts, presence and propinquity of caregivers), loneliness has been associated with impaired daytime functioning, reduced physical activity, lower subjective well-being, and poorer physical health. Moreover, beyond cross-sectional associations, loneliness has been shown to prospectively predict increased depressive symptomatology, impaired cognitive performance, dementia progression, significant likelihood of nursing home admission, and multiple disease outcomes (e.g., hypertension, heart disease, and stroke in older persons) [22].

Higher rates of mortality among lonely older adults have been reported by a number of researchers [15, 23, 24]. However, across studies, findings are mixed as to whether loneliness independently predicts mortality risk after adjusting for initial health status, health behaviors, depression, and social isolation. For example, Steptoe et al. [25] examined the effects of both social isolation (assessed in terms of contact with family and friends and participation in organizations) and loneliness (measured using the short form of the UCLA Loneliness Scale) on survival in a national sample of 6,500 older men and women (age 52 years and older) who participated in the English Longitudinal Study of Ageing (ELSA). Findings revealed that both isolation and loneliness were associated with increased mortality; however, following adjustments for demographic, socioeconomic and health factors, only social isolation continued to significantly predict survival. By contrast, a recent meta-analytic review of 70 independent prospective studies conducted between

1980 and 2014 – featuring a total of 3,407,134 participants – found that after accounting for multiple covariates (e.g., age, gender, socioeconomic status, health status, physical activity, smoking), the increased likelihood of premature mortality was 26% for reported loneliness, 29% for social isolation, and 32% for living alone, respectively [4]. Of note, the data indicated no difference between objective and subjective measures of social isolation when predicting elevated risk for early mortality. However, the authors concluded that given the differences in measurement approaches in previous research, questions remain regarding the relative contribution of loneliness and social isolation to mortality risk and that more research is needed in this area.

In sum, several forms of social isolation may exist (e.g., objective and perceived) that have distinct effects on health, but, to date, empirical work does not permit drawing strong inferences regarding their relative importance for adult mortality. In particular, across research studies, the overall effect size of loneliness on mortality is difficult to summarize due to the lack of uniform measures of loneliness [5], differences in the inclusion of statistical controls [26], and the use of analytic procedures that ignore survival time and censored data [24].

Theoretical Pathways Linking Loneliness to Health

Several theoretical pathways have been proposed to explain the health effects of loneliness in older adults [for a review, see 2]. As noted, loneliness has been found to be associated with adverse *health behaviors* – poorer health practices (e.g., alcohol use and smoking) and fewer health-promoting behaviors (e.g., less physical activity, poor nutrition) among older persons. Additionally, loneliness is associated with diminished *sleep* (e.g., shorter sleep duration, lower sleep efficiency, greater daytime fatigue) in later adulthood. Moreover, findings from two longitudinal health surveys of older adults [27, 28] suggest that loneliness predicts decrements in subjective sleep quality, which, in turn, feed forward to further exacerbate subsequent loneliness, suggesting a bidirectional causal relationship.

Alongside the proliferation of research on behavioral mechanisms has been an increase in studies probing the neurobiological substrates of loneliness, particularly in older adults. As reviewed by Cacioppo et al. [22], candidate *neurobiological* mechanisms include age-related changes in neuroendocrine, cardiovascular, and inflammatory stress responses; elevated vascular resistance,

blood pressure, and hypothalamic pituitary adrenocortical activity; leukocyte glucocorticoid resistance reflecting aberrant ratios of circulating white blood cells, and lower inflammatory control and diminished immunity.

Cognitive processes have also been implicated as a potential mechanism in the loneliness-health relationship. For instance, severe and persistent feelings of loneliness have been shown to impair executive functioning, heighten sensitivity to negative social stimuli, and erode interpersonal trust [for a review, see 29]. Moreover, recent work on embodied cognition has suggested that feelings of loneliness may be instantiated in various mental representations including sensorimotor perception, mimicry, and interpersonal synchrony. Specifically, Cacioppo and Cacioppo [30] reviewed data suggesting that experiences of physical warmth/coldness and feelings of social warmth/coldness share similar sensorimotor representations. Moreover, loneliness or perceived social isolation may play a role in modulating the way in which individuals perceive and mirror the expressions and actions of others, particularly nonverbal cues that may indicate social rejection.

Finally, a growing body of neuroimaging studies suggests that individual differences in loneliness are reflected in brain regions associated with basic perception and processing of social information [22]. For example, in line with behavioral data suggesting that loneliness is associated with vigilance to social threats and diminished pleasure from rewarding social stimuli, a functional magnetic resonance imaging (fMRI) study found that lonely individuals showed less activation in the ventral striatum in response to positive social stimuli compared with nonlonely individuals [31]. Furthermore, another study found that loneliness is linked to reduced gray matter density in left posterior superior temporal sulcus, a region known to be involved in early stages of social perception, including eye gaze processing, hand action, and body movement coordination [32]. Notably, the association between loneliness and posterior superior temporal sulcus size was not explained by social network size (a common component of indices assessing objective social isolation).

In sum, accumulating evidence suggests that adverse health behaviors, impaired sleep, biological dysregulation, negative social cognition, and regional brain activation to social in contrast to nonsocial stimuli may be among the key mechanisms underlying the effects of loneliness on broad-based morbidity and mortality. Research also suggests that the health effects of each of these pathways may be most apparent in later life, although

more research on age differences in the associations between loneliness and health-related processes is clearly needed.

Interventions for Loneliness

Turning to intervention studies, a key question is whether loneliness and social isolation can be alleviated among older persons. To date, a range of psychosocial interventions involving diverse study designs have been developed to reduce loneliness and social isolation in vulnerable older adults [33]. With variable success, these interventions have attempted to improve social skills (e.g., through social recreation), enhance social support (e.g., via mentoring, home visits), increase opportunities for social interaction (e.g., telephone outreach, nonverbal communication), and address maladaptive social cognition (e.g., psychological reframing or cognitive behavioral therapy). Findlay [34] reviewed 17 relevant interventions that targeted social isolation and/or loneliness in older individuals and concluded that ‘although numerous such interventions have been implemented worldwide, there is very little evidence to show that they work’. The important methodological issues identified in previous qualitative reviews of loneliness reduction include differences in the duration of interventions and frequency of the interventions sessions, potential for regression toward the mean and selection bias in nonrandomized controlled trials, the need to match interventions to specific therapies and population characteristics, and the relative paucity of randomized control trials.

Masi et al. [33] used meta-analytic techniques to quantify the efficacy of loneliness-reducing interventions. Of the 50 intervention studies analyzed, 12 were single-group pre-post studies, 18 were nonrandomized group comparison studies, and 20 were randomized group comparison studies. Within the 20 randomized studies, 10 included adults aged 60 years and older, 6 focused on adults in their middle age, 3 focused on young adults, and 1 included children. In addition, 13 of the 20 studies used the UCLA scale, 2 used the dJG scale, and the remaining 5 studies used other loneliness measures. Meta-analysis of the randomized studies revealed a small effect size (-0.198 , 96% CI = -0.32 , -0.08). Compared to other interventions, those addressing deficits in social cognition had the largest mean effect (-0.598 , 96% CI = -0.96 , -0.23). Furthermore, follow-up analysis that included potential moderators (gender, age, type of loneliness measure) revealed that only gender had a moderating influence on the effect

size. Studies with more women in the sample showed a smaller reduction in loneliness.

In sum, despite important design flaws noted in prior loneliness reduction interventions, summative findings from systematic reviews and quantitative meta-analyses suggest that well-designed loneliness interventions (i.e., randomized comparison studies) that target maladaptive social cognitions (e.g., cognitive behavioral therapy) may hold promise in mitigating loneliness. This finding is consistent with the important role that maladaptive social cognition is believed to play in the initiation and maintenance of loneliness [29]. Nevertheless, there is a need for better-designed randomized controlled trials of targeted interventions designed to alleviate loneliness among vulnerable older individuals. Specific groups of older adults who might benefit from such interventions might include those suffering from cognitive impairment and dementia, as well as the ‘oldest-old’ who are at heightened risk for loneliness due to decreasing opportunities for social connection [35].

Future Directions

Existing evidence demonstrates important links between loneliness and health in older adults. The data reviewed indicate that feelings of intense and persistent loneliness are strongly linked to various forms of psychological and physical morbidity (e.g., increased depressive symptomatology, cognitive decline, and chronic illness). More limited empirical data exists on the impact of loneliness on mortality as well as mechanisms through which successful loneliness interventions enhance health and well-being in older individuals. Overall, the limitations in the existing data provide an important impetus for future work. Below, we highlight several critical but, as yet, unresolved issues.

First, as previously noted, it is difficult to summarize the overall prevalence of loneliness across studies due to the lack of standardized measures used in previous work. Thus, a key challenge for future research is to maximize the comparability of survey questions and instruments designed to measure loneliness [5, 26]. The two most frequently used loneliness assessment tools – the UCLA Loneliness Scale and the dJG Loneliness Scale – have demonstrated reliability and validity, although as noted, there is a need for further measurement research that addresses the multidimensionality of the UCLA and dJG scales in older adult samples. Data harmonization efforts aimed to promote common measures of loneliness may

allow researchers to more easily compare and combine datasets. By identifying equivalent measures or those with comparable content, such techniques offer the opportunity for cross-national comparisons of loneliness [36].

Second, several authors have suggested that there is a bidirectional relationship between loneliness and various risk factors (e.g., initial health status, health behaviors, depression). However, with a few exceptions [e.g., 24, 23], prospective, longitudinal links between loneliness and mental and physical health have rarely been examined in previous mortality studies. In addition to providing a more rigorous assessment of mechanistic pathways, prospective, multi-wave, longitudinal studies are critically important in advancing the science of loneliness and health because they (a) allow for tests of theoretical models that assume stability of relations over time, (b) help address questions regarding duration of loneliness and whether sustained loneliness over time is associated with health outcomes above and beyond a single report, and (c) provide evidence against reverse-causality arguments, which posit that individuals who are ill may also report more loneliness. Additionally, controlled experimental studies investigating the effect of loneliness on health outcomes are especially scarce [37]. To the extent that experiences of loneliness and social rejection activate the same basic ‘neural alarm system’ [38], experimental studies that employ social rejection paradigms [see also, 39] to induce feelings of social exclusion (vis-à-vis autobiographical recall, film clips, and interactive video games) may also elicit feelings of loneliness, thereby providing a conceptual link to previous observational studies of loneliness. Additional research in this area is warranted.

Third, an important question for future research is the extent to which loneliness is confounded with social isolation and other unmeasured third variables. A number of investigators [e.g., 7, 20] have advocated testing the association between loneliness and health through careful statistical control of potential confounds (e.g., depression, pre-existing health conditions) as well as closely related constructs (e.g., objective social isolation). Although statistical controls are invaluable in nonexperimental research (e.g., prospective epidemiological studies), such adjustments may obscure the identification of potential mechanisms of change. For instance, loneliness is linked to changes in depression over time that may in turn result in health-relevant biological changes [40]. Furthermore, comparative studies in animals may play an especially informative role in advancing understanding of loneliness and social isolation and their potentially independent underlying mechanisms and treatments. For example, Ca-

cioppo et al. [39] reviewed evidence suggesting that among titi monkeys and adult baboons, social isolation from a preferred companion (i.e., loneliness) is associated with a range of behavioral and neural effects that are dissociable from isolation per se, including increased vigilance for predatory threats and elevated cardiovascular activity. Taken together, research that attempts to substantiate a causal link between loneliness and health outcomes should consider statistical controls in a theory-driven manner and the use of animal models to examine the adaptive significance of loneliness across phylogeny.

Fourth, there is a relative paucity of research examining the health effects of loneliness in non-Western countries [23]. Moreover, little work to date has examined age differences in the relative potency of theoretical pathways (e.g., health behaviors, sleep salubrity, biological systems, social cognition, and regional brain processes) through which loneliness impacts health. Thus, it remains unclear which mechanisms might accelerate the rate of morbidity and mortality in lonely older adults.

Finally, there is a dearth of studies that distinguish older adults who experience transient versus prolonged loneliness. Whereas transient feelings of loneliness may motivate individuals to reconnect with other individuals, prolonged loneliness increases withdrawal and cognitive vigilance to social threat [29]. Person-centered approaches (e.g., latent growth mixture modeling) that allow for a mapping of specific subgroups of lonely older adults may inform targeted intervention programs. Thus, future research should consider interventions that target specific populations of older adults (e.g., functionally disabled, hearing impaired, limited mobility) and clarify which interventions are most beneficial for those with varying levels of loneliness.

Conclusion

In this article, we focused on what is currently known regarding the health effects of loneliness in later adulthood, giving emphasis to theoretical predictions, underlying mechanisms, and methodological gaps that currently exist in the literature. Although there is growing interest in studying the prevalence and detrimental effects of loneliness in later life, full understanding of the phenomenon is far from complete. Questions remain about whether the associations between loneliness and health reflect the effects of loneliness, the effects of objective social isolation, or the effects of unmeasured variables. Thus, longitudinal and experimental studies addressing

the direct, indirect, and moderated effects of social isolation and loneliness on health are urgently needed. More research is also needed to clarify the brain mechanisms underlying the association between loneliness and cognitive decline in old age and the extent to which such de-

cline is reversible through intervention. To the extent that progress can be made on these issues, efforts to combat loneliness, particularly among older persons, may play an important role in improving well-being, minimizing chronic illness, and prolonging life.

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