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# Loneliness, Social Isolation, and Sleep Pattern in Elderly; A Systematic Review

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ABSTRACT

**Aims** Loneliness encompasses a range of emotions stemming from unmet personal and interpersonal needs, often arising from social isolation, a prevalent issue among older individuals. Existing research findings remain inconclusive regarding the precise relationship between loneliness, social isolation, and sleep patterns among the elderly. The present review aimed to explore the interconnection between loneliness, social isolation, and sleep.

**Information & Methods** This review was conducted following the PRISMA 2020 guidelines. The literature search covered databases, such as PubMed, Wiley Online Library, ScienceDirect, and ProQuest. The initial keywords were loneliness, social isolation, sleep, and elderly or older adults. These keywords were further expanded and refined using Medical Subject Headings provided by the National Center for Biotechnology Information.

**Findings** A systematic online search revealed 13,418 publications. Out of these, 88 articles did not meet the inclusion criteria during the full-text screening phase, leaving only 13 articles eligible for in-depth analysis. The results indicated a strong interconnection between loneliness and social isolation.

**Conclusion** Feelings of loneliness and social isolation are associated with reduced sleep quality among the elderly.

**Keywords** Loneliness; Social Isolation; Sleep; Elderly

CITATION LINKS

[1] Who are lonely? Loneliness ... [2] Prolonged social isolation ... [3] Social isolation, loneliness, and health behaviors ... [4] Loneliness and social isolation as risk ... [5] Loneliness, social isolation, their synergistic ... [6] Loneliness and social isolation is associated ... [7] Living alone in later life ... [8] Older adults living ... [9] Does the institutionalization influence ... [10] Epidemiology of loneliness ... [11] Ageing, health, loneliness ... [12] Family support and loneliness among ... [13] Abuse of older ... [14] Loneliness and social isolation interventions for ... [15] Associations of objective versus subjective ... [16] Longitudinal associations between family ... [17] Short- and long-term health consequences ... [18] Epidemiology of insomnia: Prevalence ... [19] The mediating role of sleep ... [20] Recommended amount of sleep ... [21] Towards a socioeconomic model ... [22] The longitudinal association ... [23] Association of β-amyloid burden ... [24] The prevalence of depressive ... [25] Sleep disturbance, sleep disorders ... [26] Cancer-related problems ... [27] Sleep and social relationships ... [28] PRISMA 2020 explanation and ... [29] Associations of loneliness ... [30] Reciprocal effects between ... [31] COVID-19 related loneliness ... [32] The association between sleep ... [33] Psychosocial correlates of aspects ... [34] Perceived stress mediates ... [35] Association between loneliness, sleep behavior ... [36] Loneliness and sleep in older ... [37] Relationships between personal ... [38] Prospective associations of social isolation ... [39] Illuminating the psychological ... [40] Effect of psychosocial care model ...[41] Meditation program mitigates loneliness ... [42] The experiences and needs of Asian ... [43] Describing reasons for loneliness ... [44] Social isolation and loneliness ... [45] Do stress, health behavior ... [46] Loneliness as a public health ... [47] The effect of loneliness ... [48] The complexity of ... [49] A systematic review of loneliness ... [50] Loneliness, but not social distancing ... [51] Loneliness as a predictor of ... [52] Psychological features of the ... [53] The influence of social support ... [54] Predicting well-being among ... [55] Care stress experienced by caregivers ... [56] Identification of comprehensive ... [57] Sex differences in subjective ... [58] Circadian rhythms, sleep, immunity ... [59] Self-reported snoring is associated ... [60] Impact of acute sleep restriction ... [61] The mind after midnight: Nocturnal ... [62] Sleep disturbances are associated with ... [63] The strength of family ties ...

## Introduction

Loneliness encompasses an individual's subjective perception of emotional distress stemming from inadequate social connections in terms of quality or quantity [1]. In contrast, social isolation denotes an objective absence of social interactions [2]. Both loneliness and social isolation have been linked to declining health and heightened mortality rates in elderly populations [3, 4]. Despite their correlation, these two phenomena are distinct; a person experiencing loneliness may not necessarily be socially isolated, and vice versa [5, 6].

The issue of elderly individuals living alone is a significant societal concern often overlooked, and its prevalence has surged due to growing economic pressures [7]. The circumstance arises from various factors like separation from a spouse, children, or a desire for independence [8].

Loneliness encompasses a complex range of emotions tied to unmet social and personal needs and is closely intertwined with social isolation, particularly prevalent among older adults. A longitudinal study conducted over eight years revealed that 9% of the elderly population in the UK experience severe loneliness, while 30% have mild loneliness, indicating the importance of strong social networks and good health in preventing loneliness. Furthermore, the growth of the elderly population has resulted in a surge in the number of seniors residing in long-term care institutions [9].

Numerous research endeavors spanning various countries, such as Australia, Iran, Malaysia, and the United States have delved into the escalating issue of loneliness among older individuals [10-12]. These studies primarily focused on examining the correlation between community engagement and feelings of loneliness. In Malaysia, particular attention was given to exploring the link between loneliness and the involvement of older adults in religious activities, which often serve as a cornerstone for social interactions in numerous cultures and offer external support. As the global population ages at a swift pace, fostering a sense of community becomes increasingly crucial, especially considering the revelation of the World Health Organization (WHO) regarding the substantial surge in older people living in solitude worldwide, including in rural areas [13].

The literature discusses different forms of social isolation, categorizing them as subjective and objective. Subjective social isolation refers to the personal perception of inadequate social resources, like companionship or support from others [14]. Studies have consistently shown a direct link between both types of social isolation and conditions like sleep disruptions, depression, and fatigue. Emotional loneliness, a form of subjective social isolation rooted in inadequate support from peers, is strongly linked to reduced sleep quality [15]. Wakefield *et al.* [16] reported that individuals with strong social connections experience better sleep.

Interrupted sleep, and insufficient time for recuperation, have been proposed to interfere with typical hormonal, metabolic, and neurological functions [17], leading to declining health [18], diminished life satisfaction [19], and heightened mortality rates [20]. Additionally, numerous other factors contributing to sleep disorders and disruptions have been identified, such as being female, economic hardship [21], loss of a spouse [22], early signs of cognitive decline [23], feelings of depression [24], respiratory issues, cardiovascular conditions [25], and even cancer [26].

The previous systematic review elucidated the correlation between social relationships, particularly close ones, and individuals' sleep patterns. However, these studies encompassed a broad spectrum of research across different age groups and health statuses [27]. The present review aimed to thoroughly examine the existing body of literature regarding the connection between loneliness, social isolation, and sleep. A systematic investigation was carried out to analyze the current state of research on the correlation between feelings of isolation and sleep patterns, giving particular attention to how samples were selected and measurements were conducted.

## Information and Methods

This review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines 2020 [28].

### Inclusion criteria

The inclusion criteria were studies in English assessing the elderly as defined by the WHO aged 65 years or older and also those discussing the relationship between loneliness or social isolation among the elderly and all forms of sleep disturbances. Also, the included studies should be observational or mixed methods studies. For the study location, we limited it to the community or locations outside of geriatric service facilities, such as nursing homes or similar hospitals. Typically, there were well-structured or scheduled programs for the elderly in the neighborhood, even if their next of kin visits infrequently. Additionally, the elderly may feel more engaged when reside in such environments due to the presence of other elderly that creates a more comfortable atmosphere for them. Studies involving sleep disorders, like sleep apnea and other severe disorders were excluded. Dissertations, proceedings, books, commentaries, case studies, and systematic reviews were also eliminated.

### Search strategy

We utilized four reputable electronic databases to search for relevant literature, namely PubMed, Cochrane Library, Wiley Online Library, and ScienceDirect. To ensure the collection of all relevant articles in each database, a filter was applied to

include the studies conducted from 2000 to October 2022. The exploration involved combining keywords associated with loneliness and its related aspects, along with terms related to social isolation and its impact on sleep patterns. The search was conducted by examining subject headings (MeSH terms) and reviewing both the title and the content within the abstracts of the articles. Search terms were adjusted as necessary for different databases. The search terms used are ((((((((((("loneliness" [MeSH terms]) OR ("loneliness/psychology" [MeSH terms])) AND ("social isolation" [MeSH terms])) OR ("social isolation/complications" [MeSH terms])) OR ("social isolation/diagnosis" [MeSH terms])) AND ("sleep" [MeSH terms]))) OR ("sleep duration" [MeSH terms])) OR ("sleep latency" [MeSH terms])) OR ("sleep quality" [MeSH terms])))) AND (elderly [Title/Abstract])) OR ("older adult" [Title/Abstract]). The review involved examining the reference lists of selected studies obtained through electronic searches and review of the articles. We manually explored other potentially relevant studies, including dissertations, conference reports, and unpublished sources, by employing unrestricted text and keyword queries in Zetoc (a platform for conference records) and OpenGrey (a repository for grey literature in Europe). In cases where necessary or feasible, we reached out to authors via email to acquire full text or seek clarification on specific points.

## Selection process

Three reviewers individually selected studies for inclusion in the review (STU, RSI, and SRS). They screened all titles of the identified studies. Subsequently, they reviewed the abstracts of relevant studies and retrieved and examined the full texts of those still considered potentially pertinent. Another reviewer cross-checked all studies approved by one assessor to ensure compliance with the inclusion criteria during the selection process. The consensus between reviewers exceeded 99%. Any queries regarding inclusion or exclusion were resolved through discussions involving a third evaluator (STU, RSI, and SRS).

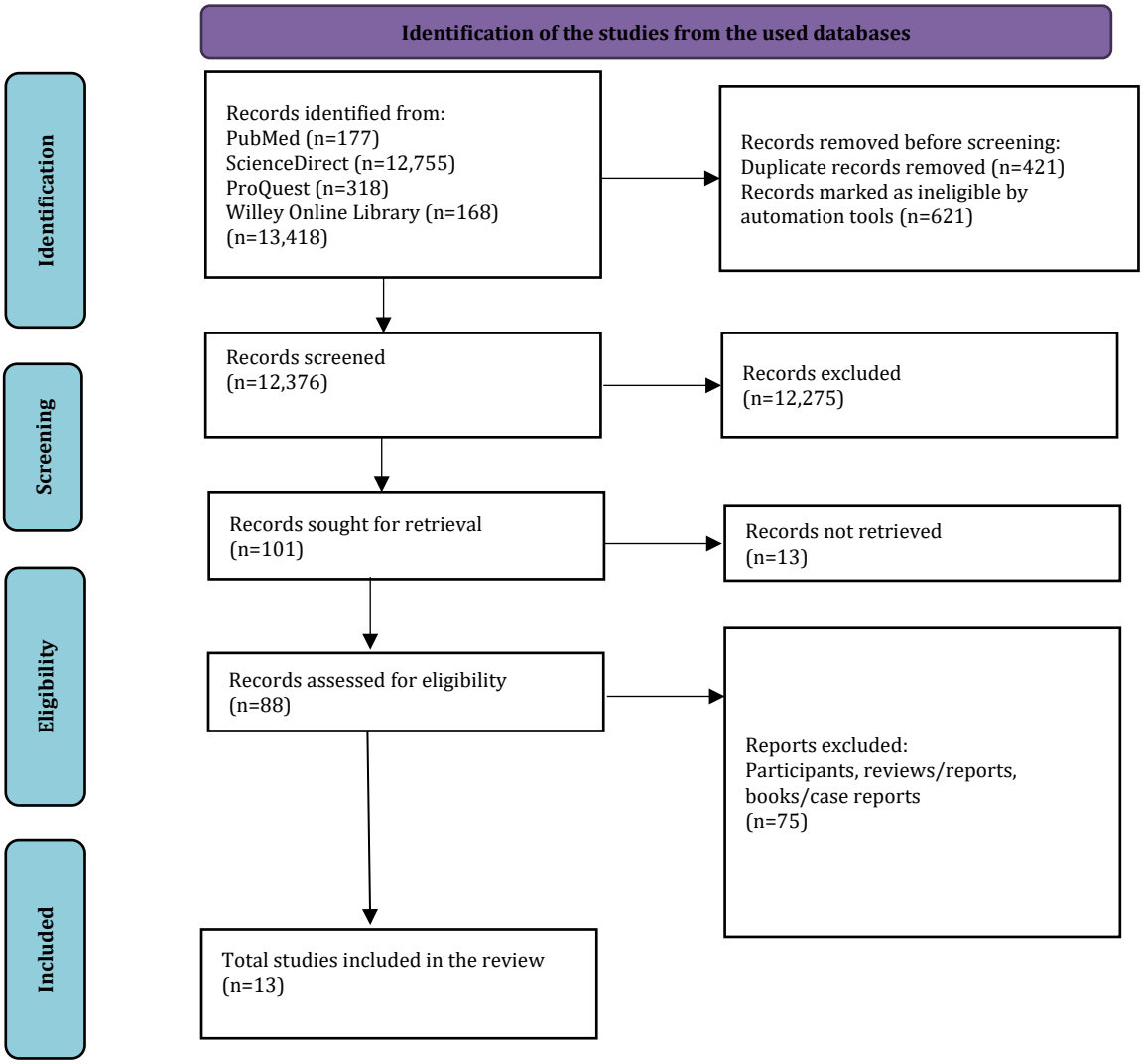


**Figure 1.** PRISMA flow diagram of the literature search

### Quality appraisal

The included studies underwent evaluation concerning study design, methodology, and analysis. Subsequently, the studies were categorized as strong, moderate, or weak based on the criteria outlined in the EPHPP tool. This tool assesses studies using specific criteria, such as selection bias, study design, confounding factors, blinding, data collection techniques, withdrawals, drop-outs, intervention integrity (for intervention studies), and analyses. It demonstrated significant consistency among individual components and a notable intra-class correlation coefficient. These methods for assessing quality and the resulting ratings assess the credibility of individual studies. They do not aim to compare the significance of findings across studies but rather indicated the robustness of the study and, consequently, the confidence or reliability of the study's outcomes.

## Findings

### Study selection

A systematic electronic search yielded a total of 13,418 publications through a comprehensive examination of related papers. Subsequent screening of full-text articles was conducted on 12,376 papers. During the full-text screening phase, 88 of these papers did not meet the eligibility criteria, resulting in a total of 13 articles deemed suitable for further in-depth investigation (Figure 1).

The characteristics of the included studies extracted in terms of their design, sample, outcomes, tools and findings (Table 1).

**Table 1.** Characteristics of studies included

| Author(s), year, country | Study design | Sample | Outcomes | | Tool(s) | Findings |
|---|---|---|---|---|---|---|
| | | | Main | Secondary | | |
| **Benson *et al.*, 2021, US** [29] | Longitudinal | 759 | Sleep metrics, loneliness, and social isolation | Demographic characteristics | Actigraph and the Social Isolation Scale | - Social isolation is significantly associated with later wake times<br>- Sleep disruption is significantly associated with greater loneliness<br>- The insomnia symptom score is strongly associated with loneliness |
| **Cho *et al.*, 2018, US** [15] | Cross-sectional | 2,541 | Social network size, sleep disturbance, depressive symptoms, and fatigue | Demographic characteristics | Interviews via phone call, the Chalder Fatigue Questionnaire (CFQ), the Pittsburgh Sleep Quality Index (PSQI), and the Center for Epidemiological Studies Depression Scale (CES-D) | - Social isolation is associated with sleep disturbance, depression, and fatigue |
| **Griffin *et al.*, 2019, US** [30] | Cross-sectional | 5,067 | Loneliness and sleep disturbances | Demographic characteristics | The Hughes Loneliness Scale and the Jenkins Sleep Scale | - Loneliness is associated with sleep disturbance |
| **Grossman *et al.*, 2021, Israel** [31] | Cross-sectional | 243 | Loneliness, sleep problems, and resilience | Background characteristics, including age, gender, marital status, and education | the UCLA Loneliness Scale, the 10-item Connor-Davidson Resilience Scale, the Insomnia Severity Index, and the PHQ-9 Depression Questionnaire | - Loneliness and sleep problems are strong at +1 SD of COVID-19 worries<br>- Loneliness and sleep problems are weak at -1 SD of COVID-19 worries |
| **Jia & Yuan, 2020, China** [32] | Cross-sectional | 1,658 | Loneliness and sleep quality | Socio-demographic characteristics, Health-related behaviors, and quality of life | SF-36, the University of California at Los Angeles (UCLA) Loneliness Scale (version 3), and the Pittsburgh Sleep Quality Index (PSQI) | - An increase in the odds of loneliness is associated with an increase in the sleep quality score<br>- The worse the quality of sleep is associated with high levels of loneliness |
| **McLay *et al.*, 2021, New Zealand** [6] | Cross-sectional | 95,045 | Loneliness, social isolation, and sleep problems | Demographic characteristics | The interRAI Home Care (interRAI HC) | - Significant associations between the loneliness/social isolation and the two sleep problem variables |
| **McHugh *et al.*, 2011, Ireland** [33] | Cross-sectional | 505 | Sleep quality, depression, loneliness, personality, and stress | - Poly-pharmacy (taking more than four medications regularly), a verbal rating scale of pain, age and gender, and medical co-morbidities | The PSQI, the Centre for Epidemiology Scale-Depression (CES-D-8), the de Jong-Gierveld Scale, the Eysenck Personality Inventory, and the Perceived Stress Scale | - Loneliness and stress are significantly correlated with the poor sleep category |

Continue of Table 1 from the last page.

| | | | | | | |
|---|---|---|---|---|---|---|
| **McHugh & Lawlor, 2012, Ireland** [34] | Cross-sectional | 624 | Loneliness, stress, and sleep quality | Age, gender, demographic characteristics, and co-morbidities | The de Jong-Gierveld Scale, the Perceived Stress Scale, and the PSQI | - Loneliness is correlated significantly with sleep quality |
| **Peng *et al.*, 2021, China** [35] | Cross-sectional | 11,696 | Loneliness and sleep behavior | Demographic characteristics and physical exercise | PSQI | - Sleep latency is longer in lonely elderly |
| **Shankar, 2019, UK** [36] | Cross-sectional | 5,698 | Loneliness, sleep duration, and sleep problems | Demographic characteristics, diagnosis, and socioeconomic | The short form of the Revised UCLA Loneliness Scale and the Jenkins Sleep Problems Questionnaire | High loneliness is associated with short sleep |
| **Wakefield *et al.*, 2019,** [16] | Cross-sectional | 527 | Loneliness, sleep quality, and depression | Demographic characteristics | The 4-item Group Identification Scale (GIS), Short Loneliness Scale, the PSQI, the Insomnia Severity Index, and the Hospital Anxiety and Depression Scale (HADS) | - Depression and loneliness are positive predictors of poor sleep quality/insomnia severity |
| **Yao *et al.*, 2008, China** [37] | Cross-sectional | 187 | Sleep quality, depression, and social network | Demographic characteristics, disease history, and lifestyle behaviors | The Geriatric Depression Scale (GDS-C), the Chinese Version of the Pittsburgh Sleep Quality Index (PSQI) | - Depression tendency and relationships with relatives are associated significantly with sleep quality |
| **Yu *et al.*, 2017, China** [38] | Cross-sectional | 1497 | Sleep quality, social isolation, and loneliness | Socio-demographics, Health-related behavior, and health status | The PSQI, the CES-D, and the SPMSQ, | - Higher levels of social isolation are associated with poorer sleep quality<br>- The association between loneliness and sleep quality is non-significant |

## Study quality

The moderately weighted cross-sectional design of quantitative research prevented them from receiving a high-quality ranking based on the EPHPP criteria. One study exhibited weakness in selection bias, while the other five studies fell into the moderate category. Three studies lacked confounding controls, and four studies were classified as moderate in this aspect. One study displayed weaknesses in withdrawal and dropout. Overall, five studies were categorized as weak in quality (Table 2).

## Characteristics of the studies included

Geographically, the included studies originated from six different countries classified as developed countries, including China (n=4), the United States (n=3), the United Kingdom, and Ireland, each contributing two studies, and one study each from Israel and New Zealand.

The number of participants in the study, drawn from both secondary and direct data sources, ranged from 187 to 95,054 older adults. There were no reports of restrictions on characteristics based on gender or other significant attributes. The ethnic variable of each participant was also documented, indicating a general and random sampling approach. Each study highlighted significant ethnic diversity among participants, particularly in European and American countries.

## Loneliness effect on sleep

The reviews included in this study indicated a significant degree of correlation between the research outcomes. However, the research did not find any connection between loneliness and poor sleep, or poor sleep quality in the elderly.

**Table 2.** Summary of EPHPP quality assessment ratings

| Author(s) | Global rating | Selection bias | Study design | Confounders | Blinding | Data collection methods | Withdrawals and dropouts |
|---|---|---|---|---|---|---|---|
| **Benson *et al.*, 2021** [29] | Moderate | Strong | Weak | Strong | Strong | Strong | Strong |
| **Cho *et al.*, 2018** [15] | Moderate | Strong | Weak | Strong | Moderate | Strong | Strong |
| **Griffin *et al.*, 2019** [30] | Weak | Moderate | Weak | Strong | Moderate | Moderate | Weak |
| **Grossman *et al.*, 2021** [31] | Moderate | Moderate | Weak | Moderate | Moderate | Strong | Strong |
| **Jia & Yuan, 2020** [32] | Moderate | Strong | Weak | Strong | Strong | Strong | Strong |
| **McLay *et al.*, 2021** [6] | Weak | Moderate | Weak | Weak | Moderate | Moderate | Moderate |
| **McHugh *et al.*, 2011** [33] | Weak | Weak | Weak | Strong | Moderate | Strong | Moderate |
| **McHugh & Lawlor, 2012** [34] | Moderate | Strong | Weak | Moderate | Moderate | Strong | Strong |
| **Peng *et al.*, 2021** [35] | Weak | Moderate | Weak | Weak | Moderate | Moderate | Moderate |
| **Shankar, 2019** [36] | Moderate | Strong | Weak | Strong | Strong | Moderate | Moderate |
| **Wakefield *et al.*, 2019** [16] | Moderate | Strong | Weak | Moderate | Strong | Strong | Moderate |
| **Yao *et al.*, 2008** [37] | Moderate | Moderate | Weak | Moderate | Moderate | Strong | Moderate |
| **Yu *et al.*, 2017** [38] | Weak | Strong | Weak | Weak | Moderate | Moderate | Moderate |

## Discussion

The present review aimed to explore the interconnection between loneliness, social isolation, and sleep. Loneliness is prevalent among the elderly [39], particularly in developed countries facing significant economic pressures to meet daily needs [40-44]. Consequently, this situation notably affects non-productive groups such as the elderly. Several studies have highlighted the impact of loneliness on health conditions across all age groups [45-49]. In certain instances, there is a high likelihood of individuals experiencing dangerous psychological disorders like suicidal ideation [50, 51]. Loneliness can be a subjective feeling that one person may encounter while others may not, even in similar circumstances [52]. A theory suggests that an individual's capacity to adapt to an environment or stressor varies considerably. There is no certainty regarding whether a person can effectively cope with it [53-55].

Loneliness among the elderly served as a triggering factor for sleep disturbances. Reduced sleep quality in the elderly may manifest as insomnia [56], sleep latency [57], alterations in circadian rhythms [58], and snoring [59]. A study indicates that social isolation acts as an intermediary linking the occurrence of sleep disturbances. However, as highlighted by Yu *et al.* [38], both social isolation and loneliness may have distinct roles in contributing to sleep difficulties. The impact of social isolation on sleep problems could persist for a longer duration compared to self-reported loneliness, or it is plausible that social isolation exacerbates sleep issues in individuals experiencing loneliness.

In addition to social isolation, depression also contributes to changes in sleep patterns among the elderly. McHugh & Lawlor [34] demonstrate that there is a relationship between depression, as measured by HADS and PSQI scores, in the elderly. Numerous studies have established a strong connection between these two factors, with depression identified as a primary psychological element contributing to sleep-related issues in elderly individuals. Negative endorsements provide substantial support for a significant relationship between depression and sleep patterns in the elderly, as evidenced by several items in the PSQI assessment. Yao *et al.* [37] emphasize that depression significantly impacts sleep quality, underscoring the importance of addressing depression not only for mental well-being but also for enhancing overall sleep quality. Depressed individuals exhibit higher total brain glucose metabolism than healthy individuals in the non-REM stage [60], supporting the over-arousal hypothesis in depressed individuals. The reduction in brain activity from the wakeful state to non-REM sleep may be hindered by hypo-frontality during wakefulness [61]. Typically, there is a noticeable decrease in cortical brain activity during non-REM sleep in healthy individuals. This decline in brain activity from pre-sleep to non-REM phases is believed to aid in the restoration of cognitive function during sleep. Conversely, individuals experiencing depression may struggle to reduce cortical activity, especially in the frontal region, leading to sleep disturbances and non-refreshing sleep [62].

Considering other variables, particularly depression, diminishes the connection between loneliness and sleep disruption, highlighting a close association between loneliness and depression. However, solely focusing on depression does not fully elucidate the interplay among depression, loneliness, and sleep disturbance [39]. Further investigation is necessary to comprehend how loneliness and sleep disruption are intertwined with depression, encompassing their relationships with additional elements such as demographic factors.

We did not find any evidence suggesting that age or gender influences the correlation between loneliness and sleep disruption. Consistent with previous comprehensive studies examining social relationships, isolation, loneliness, and social support, gender did not emerge as a factor influencing this connection [4, 63]. However, the available information on age as a moderating factor is inconclusive: In younger groups, the association between mortality, loneliness, isolation, and living alone appears more pronounced [4]. Conversely, another meta-analysis indicated a stronger relationship between mortality and social support in the elderly [63]. Despite this discrepancy, age was not identified as a moderator in these studies. Age was only viewed as a risk factor and a source of resilience in later life in these analyses. Consequently, protective mechanisms might become apparent later in adulthood, potentially altering the relationship between loneliness and sleep disruption in the opposite direction.

We acknowledge the existence of limitations in the current study that may impact the general applicability of the findings. Therefore, future researchers utilizing the results of this study must exercise caution in their interpretations. The limitations of this study are linked to the non-exhaustive literature search primarily due to the authors' limited access to high-quality databases, hindering swift access to the databases in question. Additionally, we restricted articles to those published in English. However, we do not discount the possibility that numerous high-quality articles may exist in languages other than English.

The World Health Organization's report outlines strategies to combat loneliness, emphasizing the identification of high-risk individuals and the implementation of diverse approaches, including group interactions and technology-based initiatives, ideally with interactive and socially beneficial components. These interventions should be customized based on specific population

characteristics, taking into account cultural diversity, institutional settings, and physical limitations. Strategies aimed at reducing loneliness should be incorporated into sleep improvement programs designed for older adults facing sleep challenges.

## Conclusion

Feelings of loneliness and social isolation are linked to decreased sleep quality among older individuals.

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