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Impact of social isolation on behavioral health in elderly: Systematic review

Hanbyul Choi, Michael R Irwin, Hyong Jin Cho

Hanbyul Choi, St. George's University School of Medicine, Grenada, West Indies, the North American Correspondent, Great River, NY 11739, United States

Michael R Irwin, Hyong Jin Cho, Cousins Center for Psychoneuroimmunology, Semel Institute for Neuroscience and Human Behavior, Department of Psychiatry and Biobehavioral Sciences, David Geffen School of Medicine, University of California-Los Angeles, Los Angeles, CA 90095, United States

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Correspondence to: Hyong Jin Cho, MD, PhD, Cousins Center for Psychoneuroimmunology, Semel Institute for Neuroscience and Human Behavior, Department of Psychiatry and Biobehavioral Sciences, David Geffen School of Medicine, University of California-Los Angeles, 300 UCLA Medical Plaza, Suite 3140, Los Angeles, CA 90095, United States. hjcho@mednet.ucla.edu
Telephone: +1-310-8250227
Fax: +1-310-8256483

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Abstract

AIM: To examine and compare the effects of subjective and objective social isolation on behavioral health in elderly adults.

METHODS: A systematic search of PubMed was performed for original research articles from peer-reviewed journals examining one of the following topics: "Social isolation and sleep disturbance", "social isolation and depression", or "social isolation and fatigue in older adults". Studies were selected following the criteria established based on the aim of this review. Data were extracted from the articles by two independent reviewers. Due to the heterogeneity in study designs and outcome measures of the included studies, qualitative and narrative analyses were conducted.

RESULTS: The set criteria were used to select a total of 16 studies for the review. Of the 16, 13 were cross-sectional studies. The characteristics of study populations were identified as follows. A total of 12 studies randomly selected subjects irrespective of pre-existing health conditions. Consequently, an unspecified number of the study subjects had chronic diseases in the studies compared. In addition, cultural and ethnic backgrounds of studies in this review were diverse, and included subjects living in North America, South America, Asia, Europe, and Oceania. Both subjective and objective types of social isolation increased behavioral symptoms, such as sleep disturbance, depressive symptoms, and fatigue in older adults. Furthermore, a few recent studies reported stronger effects of subjective social isolation than objective social isolation on sleep disturbance and depressive symptoms.

CONCLUSION: Social isolation affects behavioral

health in older adults. Compared to the objective social isolation, subjective social isolation contributes more significantly to sleep disturbance and depression.

Key words: Older adults; Depression; Subjective social isolation; Objective social isolation; Sleep disturbance; Fatigue; Systematic review

Core tip: Older adults often experience social isolation which may have a profound negative effect on their behavioral health. However, to date, no systematic review has addressed this issue. Furthermore, few studies have distinguished the effects of subjective *vs* objective social isolation on behavioral health in this population. The findings of this systematic review suggest that social isolation in late life may indeed increase behavioral symptoms such as sleep disturbance, depression, and fatigue. Moreover, the effects of subjective social isolation, compared to objective social isolation, may contribute more significantly to sleep disturbance and depressive symptoms.

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INTRODUCTION

Older adults frequently report social isolation. In turn, social isolation in the aging population has been shown to have a profound negative effect on longevity and physical and mental health[1]. There are two types of social isolation, subjective and objective. In the recent literature, subjective social isolation has been characterized as "a perceived shortage in one's social resources, such as companionship or social support"[2]. Objective social isolation has been explained as "lack of contact with others due to situational factor, such as small size of social network, infrequent social interaction, or lack of participation in social activity"[2]. Therefore, the effects of social isolation could be due to an objective deprivation of social network and/or subjective experience of social isolation.

Several studies consistently demonstrated that both subjective and objective types of social isolation positively correlate with sleep disturbance, depression, and fatigue. Subjective social isolation, such as emotional loneliness coming from low support from coworkers, was associated with poor quality of sleep[3,4]. Studies on breast cancer survivors also suggest that those who feel lonelier experience more pain, symptoms of depression, and fatigue[5,6]. Friedman *et al*[7] studied objective social isolation and concluded that individuals who had a positive social relationship reported better sleep quality. An interventional study also showed that 4-8 wk of internet chatting with volunteer students who study psychology reduced loneliness and depressive symptoms by increasing the perception of social support[8].

Fewer data are available on older adults, even though older adults are more likely to face social isolation and its impact on behavioral health may be more robust. Furthermore, behavioral symptoms, such as sleep disturbance, depression and fatigue, are highly prevalent among older adults and may impair functioning, quality of life, and physical health[9-11]. However, to date, no systematic review has addressed this topic. Furthermore, few studies have distinguished the effects of subjective *vs* objective social isolation on behavioral health in older adults. Therefore, this systematic review aimed to: (1) Examine whether social isolation is associated with behavioral symptoms (sleep disturbance, depression, and fatigue) among older adults; and (2) Compare the effects of subjective *vs* objective social isolation on the same behavioral symptoms. The study hypotheses were: (1) Older adults with social isolation are more likely to experience sleep disturbance, depression, and fatigue; and (2) Compared to objective social isolation, subjective social isolation has a stronger impact on sleep disturbance, depression, and fatigue among older adults.

MATERIALS AND METHODS

Search strategy

A systematic literature search was performed using PubMed as the primary search engine, from its inception to April 2015. The PubMed search for social isolation research was conducted on three different topics: sleep disturbance, depression, and fatigue. For the topic "social isolation and sleep disturbance", search terms used were as follows: (feeling of seclusion OR loneliness OR social withdrawal OR social network OR social isolation) AND (sleep disorder OR insomnia OR sleep disturbance OR sleeplessness OR poor sleep quality OR somnolence OR altered sleep pattern OR sleep disruption). For the topic "social isolation and depression", a more focused and efficient search, using Medical Subject Headings (MeSH), was conducted given that there were a much larger number of references on this topic compared to the other two topics. Search terms were as follows: ["social isolation" (MeSH) OR "social network" (MeSH) OR "loneliness" (MeSH)] AND ["depression" (MeSH) OR "depressive" (MeSH)]. For the topic "social isolation and fatigue," search terms were used as follows: (loneliness OR social network OR social isolation) AND (fatigue OR weakness OR malaise). In the subsequent step, selection of abstracts was conducted based on the relevance of titles to the topics. After reading selected abstracts, selection of full articles was conducted based on how much the content of abstracts was significant in supporting the hypotheses of this review. All search results were filtered by "humans" for the species section of the PubMed website search tool.

Study selection

Study selection was conducted by two independent reviewers. The inclusion criteria for the articles were as follows: (1) Type of studies: original research studies including observational and interventional studies; (2) Participants: older adults broadly defined as subjects older of than 50 years; when the exact age distribution was unavailable, studies involving subjects whose average age was greater than 55 years were included; (3) Independent variables: subjective and/or objective social isolation; and (4) Dependent variables: symptoms of sleep disturbance, depression, or fatigue.

Data extraction

Data extraction was focused on the review aims. The following data were extracted by the two independent reviewers: (1) Authors and year of publication; (2) Study design; (3) Age range of subjects; (4) Health status of subjects; (5) Cultural/ethnic background of subjects; (6) Assessment methods; and (7) Outcomes (significance).

Data synthesis

Due to the heterogeneity of the study designs and outcome measures, no meta-analysis was conducted. Instead, a narrative data synthesis was performed.

The statistical methods of this study were reviewed by a statistician for the University of California-Los Angeles (Los Angeles, CA, United States).

RESULTS

Characteristics of study populations

Most studies selected participants randomly, regardless of pre-existing medical or mental conditions. As a result, there were a varying number of participants with chronic diseases in the reviewed studies. In addition, this review evaluated studies that were conducted among subjects from diverse cultural and ethnic backgrounds, including those who live in North America, South America, Asia, Europe, and Oceania.

Social isolation and sleep disturbance

For the topic "social isolation and sleep disturbance", the PubMed search identified 2625 references. Out of 2625 articles, 95 abstracts with a title relevant to the topic were selected. Out of the 95 abstracts, 21 articles were selected based on their abstract being deemed appropriate for testing of the hypotheses of this review paper. Out of the 21 articles, 6 articles specifically focused on the older adult population and evaluated the relationship between social isolation and sleep disturbance (Table 1).

Costa *et al*[12] suggested that older adults with a lower score on the Interpersonal Support Evaluation List had increased sleep onset latency or non-restorative sleep. A longitudinal study also found older adults, who felt subjectively lonely in the past, complained of more severe insomnia[13]. On the other hand, a cross-sectional study found that a group of people with higher social interaction had shorter sleep latency[14]. A study on the elderly with dementia also reported that lack of social support or not having a partner negatively affected sleep quality[15]. Yao *et al*[16] found that having a good relationship with friends and family predicted a better quality of sleep.

McHugh and Lawlor[17] found that both "emotional loneliness" (*e.g.*, subjective social isolation - the feeling of missing an intimate relationship) and "social loneliness" (*e.g.*, objective social isolation or missing a wider social network) - as defined by the De Jong Gierveld Loneliness Scale[18] - predicted sleep disturbance. However, subjective social isolation was a stronger predictor of sleep disturbance, and in fact when both measures were simultaneously included in the same multivariable regression model, only subjective social isolation remained a significant predictor[17].

Social isolation and depression

For the topic "social isolation and depression", the PubMed search identified 1045 references. Out of 1045 articles, 82 abstracts with a title relevant to the topic were selected. Out of the 82 abstracts, 22 articles were selected based on their abstract being deemed appropriate for testing of the hypotheses of this review paper. Out of the 22 articles, 8 articles specifically focused on the older adult population and examined social isolation and depression (Table 1).

A study on Mexican Americans age 80 years or older concluded that high loneliness score was significantly correlated with the symptoms of depression[19]. This finding was further supported by several recent cross-sectional studies that also reported significant correlations between loneliness and symptoms of depression[20-23]. Bekhet and Zauszniewski[24] found that, in two different retirement communities, people who reported feeling lonely had a higher rate of symptoms of depression. Park *et al*[25] examined social isolation from a different angle, that is, the level of social engagement, which is a representation of an objective social isolation. They showed that low level of social engagement caused loneliness that was associated with depressive symptoms. A recent study suggested rumination as a mediator of the relationship between loneliness and depression[26].

An article comparing two forms of loneliness: "emotional loneliness" (*e.g.*, subjective social isolation - the feeling of missing an intimate relationship) and "social loneliness" (*e.g.*, objective social isolation or missing a wider social network) - as defined by the De Jong Gierveld Loneliness Scale[18] - showed that emotional loneliness was strongly associated with depressive symptoms, whereas social loneliness had a very weak association[27].

Social isolation and fatigue

For the topic "social isolation and fatigue," the PubMed search identified 2891 references. Out of the 2891

Table 1 Summary of 16 articles on older adults

Ref.	Outcome	Study design	Age in years (*n*)	Health status	Cultural/ethnic characteristics	Assessment method	Relevant results (significance)
Costa *et al*[12]	Sleep disturbance	Cross-sectional	⩾ 65 (497)	Random selection; Unspecified number of subjects had chronic diseases	Brazilian	Questionnaire, NHP, MLAQ, ISEL	Elderly with sleep problem had lower score on ISEL ($P < 0.05$)
Jensen *et al*[13]	Insomnia	Longitudinal	80 (212)	Random selection; Unspecified number of subjects had chronic diseases	Swedish	Questionnaire (graded sociological data)	Severity of insomnia associated with having felt lonely in the past ($P < 0.05$) Severity of insomnia associated with believing that future would bring loneliness ($P < 0.01$)
Troxel *et al*[14]	Insomnia	Cross-sectional	⩾ 60 (119)	Study Group: Presence of insomnia; Unspecified stable medical and psych condition Control Group: Absence of insomnia	Pittsburg, PA, United States	Questionnaire, Pittsburgh sleep diary, PSQI, actigraphy	Wakefulness after sleep; onset is lower in people with higher social support ($P < 0.01$) In group with insomnia, shorter sleep latency in higher social interaction group ($P < 0.01$)
Eshkoor *et al*[15]	Sleep disturbance	Cross-sectional	⩾ 60 (1210)	Dementia	Malaysian	SNSL, Mini-mental examination	Social support, marital status, having partner significantly affect sleep disturbance ($P < 0.05$)
Yao *et al*[16]	Sleep disturbance	Cross-sectional	65-75 (187)	Random selection; Three-fourths of subjects had chronic illness	Taiwanese	Questionnaire, PSQI (Chinese version)	Good relationship with friends and family is negatively correlated with poor sleep quality ($P < 0.001$)
McHugh *et al*[17]	Sleep disturbance	Longitudinal observational	⩾ 60 (447)	Random selection; Unspecified number of subjects had chronic diseases	Irish	DJGLS, PSQI	Emotional loneliness (subjective social isolation) rather than social loneliness (objective social isolation) is a stronger predictor of poor sleep quality ($P < 0.001$) Emotional loneliness increases stress ($P < 0.001$) Stress affects sleep quality ($P < 0.0001$)
Gerst-Emerson *et al*[19]	Depressive symptoms	Cross-sectional	80-102 (3050)	Random selection; Unspecified number of subjects had chronic diseases	Mexican American in 5 states in the United States (TX, CA, AZ, CO, and NM)	Three-item loneliness scale, 20-item CES-D	Scores on depressive symptoms are positively associated with loneliness ($P < 0.001$)
Aylaz *et al*[20]	Depressive symptoms	Cross-sectional	⩾ 60 (913)	Random selection; Unspecified number of subjects had chronic diseases	Turkish	GDS, ULS	ULS score and GDS score correlation (r) is 0.608 ($P < 0.001$)
Theeke *et al*[21]	Depressive symptoms	Cross-sectional	⩾ 65 (60)	All subjects had chronic illnesses	Appalachians	ULS, CES-D, GDS	ULS score and depression has correlation coefficients value (r) of 0.388 ($P < 0.01$)
Adams *et al*[22]	Depressive symptoms	Cross-sectional	60-98 (234)	Random selection; Subjects had 1.7 chronic diseases on average	Northeast United States (Retirement community affiliated with Methodist Church)	ULS, GDS	ULS score and GDS score correlation (r) is 0.458 ($P < 0.005$)
Alpass *et al*[23]	Depressive symptoms	Cross-sectional	⩾ 65 (217)	Random selection; 61% of subjects had chronic illness or disability	New Zealand	ULS, GDS	ULS score and GDS score correlation (r) is 0.625 ($P < 0.01$)
Bekhet *et al*[24]	Depressive symptoms	Cross-sectional	65-84 (314)	Random selection; Unspecified number of subjects had chronic diseases	Cleveland, OH, United States (Retirement community)	Questionnaire, CES-D	Elderly who reported feeling lonely had higher depressive symptom ($P < 0.001$)

Park *et al*[25]	Depressive symptoms	Cross-sectional	⩾ 60 (674)	Random selection; Unspecified number of subjects had chronic diseases	Korean Americans in Tampa and Orlando, FL, United States	SNSL, 20-item ULS, GDS-short form	Loneliness mediates the relationship of social engagement related variables with depressive symptom ($P < 0.05$) Social engagement related variables: not living alone, social network, activity participation Exception: the relationship of social network and loneliness in men
Wan Mohd Azam *et al*[27]	Depressive symptoms	Cross-sectional	⩾ 60 (161)	Random selection; Unspecified number of subjects had chronic diseases	Malaysian (Rural/ agricultural settlement)	DJGLS, GDS, MOSSS	When perceived social support decreases, feeling of loneliness increases ($P < 0.01$) Social support mediates between loneliness and depression ($P < 0.05$) Social loneliness and depression: Pearson correlation (r) is -0.189 ($P < 0.05$) Emotional loneliness and depression: Pearson correlation (r) is 0.403 ($P < 0.01$)
Jason *et al*[28]	Fatigue	Interventional	57.6 on average (30)	Individuals who were diagnosed with chronic fatigue syndrome in the past	Chicago, IL, United States	Buddies (intervention), questionnaire, MOSSF-36, FSS, PSS	After 4 mo of intervention (supportive interaction), severity of fatigue of experimental group decreased compared to control group based on FSS ($P < 0.05$)
Riemsma *et al*[29]	Fatigue	Cross-sectional	51-75 (229)	All subjects were diagnosed with rheumatoid arthritis	Dutch	Double-anchored VAS, SSL12-I	Problematic social support and fatigue correlation (r) is 0.28 ($P < 0.001$)

CES-D: Center for Epidemiological Studies-Depression Scale; DJGLS: De Jong Gierveld Loneliness Scale; FSS: Fatigue Severity Scale; GDS: Geriatric Depression Scale; ISEL: Interpersonal Support Evaluation List; MLAQ: Minnesota Leisure Activity Questionnaire; MOSSS: Medical Outcomes Survey Social Support; MOSSF-36: Medical Outcomes Survey Short Form – 36; NHP: Nottingham Health Profile; PSQI: Pittsburgh Sleep Quality Index; PSS: Perceived Stress Scale; SAST: Short Anxiety Stress Test; SNSL: Social Network Scale of Lubben; SSL12-I: Social Support List Interaction; ULS: University of California-Los Angeles Loneliness Scale; VAS: Visual Analogue Scale.

articles, 15 abstracts with titles relevant to the topic were selected. Out of the 15 abstracts, 6 articles were selected based on their abstract being deemed appropriate for the testing of the hypotheses of this review. Out of the 6 articles, 2 articles specifically focused on the old adult population and examined social isolation and fatigue (Table 1).

An intervention study had student buddies help subjects (mean age, 57.6 years) with household tasks for 2 h per week for 4 mo. The control group did not have student buddies for the same period. All subjects in both the experiment and control groups completed a post-intervention questionnaire. Results showed that the experiment group was less fatigued and more energetic than the control group[28]. Having a supportive relationship with others appeared to lessen the severity of fatigue. A study focusing on fatigue in rheumatoid arthritis patients further supported this finding, with a significant correlation between problematic social support and level of fatigue[29]. The authors argued that problematic social supports, such as lack of sympathy or lack of understanding from a social network, played an important role in explaining fatigue[29]. No article comparing two forms of social isolation (subjective and objective) with fatigue was available from the PubMed search.

DISCUSSION

In accordance with the initial hypotheses of this systematic review, both subjective and objective types of social isolation were associated with symptoms of sleep disturbance, depression, and fatigue in older adults. Furthermore, a few recent studies showed stronger effects of subjective social isolation than objective social isolation on sleep disturbance and depressive symptoms. The findings of this review suggest that social isolation may indeed increase behavioral symptoms in older adults, and that the effects of subjective social isolation, compared to objective social isolation, may contribute more significantly to sleep disturbance and depressive symptoms.

This review is meaningful because it has comprehensively reviewed the relationship between social isolation and behavioral symptoms that frequently affect older adults and impair their functioning, quality of life, and physical health. Furthermore, this review examined an important but poorly explored topic regarding the distinctive effects of subjective *vs* objective social isolation on behavioral symptoms. The effects of subjective isolation (*vs* objective social isolation) on behavioral symptoms were more robust. Additionally, when both were measured and simultaneously included in the

analyses, only the effects of subjective social isolation remained significant, suggesting that the effects of objective social isolation on behavioral symptoms may be dependent upon and explained by those of subjective social isolation. Thus, it can be speculated that older adults with objective social isolation may experience sleep disturbance, depression, and fatigue more often not only because they are deprived of social networks but also because they also feel socially isolated.

However, the following limitations should be considered in the interpretation of these findings. First, there was a significant heterogeneity in the design, outcome measures, and population characteristics of the included studies, and thus the meta-analytical approaches could not be employed. Of note, while this heterogeneity is certainly a limitation and does not allow for a meta-analysis, diverse cultural backgrounds and health status of the study populations may broaden the generalizability of the findings. More specifically, the inclusion of diverse cultures demonstrating similar results supports the present review that there is an association between social isolation and behavioral symptoms regardless of one's ethnic or cultural background. Second, each of the individual studies included in this review had their inherent limitations that could not be remedied in this review. In particular, most of the included studies were cross-sectional in design, and thus no causal or temporal directions could be established for the observed associations between social isolation and behavioral symptoms. Third, the literature search for the topic "social isolation and depression" was performed using MeSH terms. This focused search was an efficient way to search literature given that there were a much larger number of references on this topic compared to the other two topics. However, this focused approach could have compromised the comprehensiveness of the search.

To evaluate the causal link between social isolation and behavioral symptoms, future studies are needed to test interventions that target social isolation as potential treatments for improving behavioral health of older adults. Furthermore, the findings of this review suggest that, in testing such interventions, subjective social isolation may need to be the primary target rather than objective social isolation.

The findings of this systematic review suggest that social isolation increases sleep disturbance, depression, and fatigue in older adults. Moreover, the effects of subjective social isolation, compared to objective social isolation, contribute more significantly to sleep disturbance and depressive symptoms.

COMMENTS

Background

Behavioral symptoms such as sleep disturbance, depression, and fatigue are highly prevalent among older adults. Studies have shown that there are relationships between social isolation and behavioral symptoms that frequently affect older adults and impair their functioning, quality of life, and physical health. However, to date, no systematic review has addressed this issue. Furthermore, a few studies have distinguished the effects of subjective *vs* objective social isolation on the behavioral health in this population. The primary aim of this review was to examine whether social isolation was associated with symptoms of sleep disturbance, depression, and fatigue in older adults. The second aim was to compare the effects of subjective *vs* objective social isolation on these symptoms.

Research frontier

Several studies consistently demonstrated that both subjective and objective types of social isolation are positively correlated with sleep disturbance, depression, and fatigue. Subjective social isolation, such as emotional loneliness coming from low support from co-workers, was associated with poor quality of sleep. Studies on breast cancer survivors suggest that those who experience loneliness have more pain, symptoms of depression, and fatigue. It has been shown that individuals who had a positive social relationship reported better sleep quality. Furthermore, chatting over the internet for 4-8 wk reduced loneliness and depressive symptoms by increasing the perception of social support.

Innovations and breakthroughs

Based on the results of this systemic review, effects of subjective social isolation may have a more significant effect on sleep disturbance and depressive symptoms then objective isolation. Retrieved manuscripts related to this topic were reviewed by the authors, and data were extracted and synthesized in a narrative form.

Applications

When treating depression or insomnia, clinicians should consider helping patients get social support by assessing the level of social connection. This is especially important for those individuals who feel lonely despite having a decent objective social network. In these cases, psychotherapy should be considered in the management of their subjective rather than the objective social isolation.

Terminology

Subjective social isolation is defined as "perceived shortage in one's social resources, such as companionship or social support". Objective social isolation is defined as "a lack of contact with others due to situational factor, such as a small size of social network, infrequent social interaction, or lack of participation in social activity."

Peer-review

This paper is concise and is written in a manner which is easy to follow. The authors use good theoretical reasoning for questioning the relationship of social isolation and the chosen symptoms of study. Additionally, the limitations of their study are well explicated.

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