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Social Isolation, Loneliness and Health Among Older Adults

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Abstract

Objective: To examine the relationship of social isolation, loneliness and health outcomes among older adults. **Methods:** Using data from the Leave Behind Questionnaire of the Health and Retirement Study (2006 and 2008), (n = 11,825) several indicators of social isolation were scaled and the Hughes 3-Item Loneliness Scale was used. Two measures of health (self-rated health and mental health conditions) were examined using logistic regression. **Results:** Loneliness and social isolation were not highly correlated with one another (r = 0.201, p = 0.000). Loneliness was associated with higher odds of having a mental health problem (*OR*: 1.17; CI: [1.13, 1.21], p = 0.000); and isolation was associated with higher odds of reporting one's health as being fair/poor (*OR*:1.39; CI: [1.21, 1.59], p = 0.000). **Discussion:** The results suggest that global measures of isolation, that fail to distinguish between social isolation and feelings of loneliness, may not detect the impact on physical and mental health in older adults.

Keywords

loneliness, social isolation, aging, health

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Introduction

Social isolation is the objective lack of relationships and social interaction whereas loneliness is a subjective, distressing feeling. Both loneliness and social isolation are predictors of poor health and mortality, even after controlling for important behavioral characteristics and biological factors (Hawkley & Cacioppo, 2003). The health risks associated with loneliness and social isolation are particularly severe for older adults. This may be due to life course transitions faced by older adults including retirement, decreases in mobility, increases in illness and disability as well as the loss of spouse and other social network members. Individuals who live alone, have a small social network and infrequent participation in social activities have a higher risk of social isolation and feelings of loneliness (Yeh & Lo, 2004). Based on data from *U.S. Bureau of the Census, the Administration on Aging* reported that about 29% of all noninstitutionalized older persons in 2010 lived alone. As the percentage of older adults increases over the next few decades, particularly those that live alone, social isolation and loneliness are likely to increase. These findings suggest that older adults are at high risk of loneliness and isolation and the negative health outcomes that follow. Therefore, a better understanding of social isolation and loneliness is needed to facilitate the development of ways to combat them.

Social Isolation and Loneliness

Humans are social beings. We have a strong need for social interaction, which when not met, elicits negative outcomes (Baumeister & Leary, 1995). Older adults may experience loss of social network members through death of a friend or loved one or become increasingly more immobile due to physical or cognitive decline which can increase the risk of social isolation. However, note that the risk of loneliness does not always increase with age, and in fact, many older adults are not lonely. Further, age-related changes in expectations of social networks may contribute to an increase of satisfaction with social relationships despite the shrinking of social network size (Shaw, Krause, Liang, & Bennett, 2007).

Loneliness is the distressing feeling of social isolation that accompanies the perception of deficiency in the desired number or quality of one's social relationships (Peplau & Perlman, 1982). The key term in this definition is *perception*, meaning that individuals can live solitary lives and not feel lonely as well as have many social relationships and yet still experience feelings of loneliness. Older adults' perceptions of their social resources and relationships may not reflect their actual levels of social interaction, meaning there may be an

inconsistency between the desired and actual level of social interaction. Older adults may be able to optimize the limited number of social relationships they have or adjust expectations, so that low levels of social connectedness do not bring about feelings of loneliness (Carstensen, 1993). For example, the presence or loss of a spouse is a more important factor on loneliness rather than having contact with a close friend (Dugan & Kivett, 1994), so even if someone is embedded in a social network, the loneliness they feel may not be remedied by the joining of a social group or introduction of new social ties. These discrepancies also highlights the value of research on feelings of loneliness, actual network size, and number of social interactions among older adults, to identify potential ways of alleviating social isolation and feelings of loneliness, and the negative health consequences that follow.

Health risks associated with social isolation and loneliness have been consistently established in the literature. However the pathology between social isolation and loneliness is not yet well-understood. Few studies have distinguished between these two constructs: Objective (social isolation) and subjective (feelings of loneliness); but among those that have, evidence suggests each may have adverse effects on health and well-being (Cacioppo, Hughes, Waite, Hawkley, & Thisted, 2006; Cornwell & Waite, 2009; Golden et al., 2009).

Social Isolation, Loneliness and Health

Socially isolated adults have a range of health risks, including increased systolic blood pressure (Hawkley, Thisted, R., Masi, & Cacciopo, 2010), infection (Pressman et al, 2005), impaired cognitive function (Wilson et al., 2007), depression (Cacioppo, Hawkley, & Thisted, 2010) and mortality (Brummett et al., 2001; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). Feelings of loneliness have been associated with higher risk of elevated blood pressure (Hawkley et al., 2010), increased hypothalamic-pituitary-adrenocortical activity (Adam, Hawkley, Kudielka, & Cacioppo, 2006), and diminished immunity (Kiecolt-Glaser et al., 1984). In addition, loneliness has been associated with the progression of Alzheimer's disease (Wilson et al., 2007), depressive symptoms (Cacioppo et al., 2006), sleep issues (Cacioppo, & Hawkley, 2003) and mortality (Seeman, 2000). The level of social connectedness a person experiences impacts both psychological and behavioral processes. It has been shown that social relationships act as a buffer to the negative health effects of stress (Holt-Lunstad, Smith, & Layton, 2010; Thorsteinsson & James, 1999). Social relationships may also encourage older adults to seek preventative or appropriate medical treatment, better adhere to medications or treatment plans, and participate in less negative health behaviors (Lett et al., 2007) which, in turn, have a direct impact

on health outcomes through behavioral processes. Therefore the subsequent absence of social relationships (social isolation) as buffers stress could negatively impact health through these behavioral and psychological processes.

Alternatively, if a person experiences an imbalance in their actual level of social connectedness and their desired level of connectedness, distressing feelings of loneliness may result. It is this distressing psychological process that activates the hypothalamic-pituitary-adrenal (HPA) axis; this axis is a major part of the neuroendocrine system that controls the body's response to stress. Therefore, it is not merely the presence of social connections that can impact the health of older adults, but that feelings of loneliness may also result in negative health outcomes in older adults. While the severity of the health risks associated with social isolation and loneliness has been documented, the pathology between the two constructs is yet to be clearly determined. This study focuses on both feelings of loneliness and objective social isolation and their relationship with health among older adults.

Among the research in this area, one problem has been the difficulty in reliably studying loneliness in large-scale, population-based studies (House, 2001). As the standard measure of loneliness, the 20-item UCLA Loneliness Scale is not well-suited for large data collection efforts when loneliness is not the primary outcome of interest. Thus this well-established instrument tends to be used in smaller or clinical studies with limited generalizability. The larger-scale studies that examine loneliness tend to rely on a single item from the Center for Epidemiological Studies-Depression Scale (CES-D; Radloff, 1977). The current study improves upon previous research by its use of a more comprehensive Three-Item Loneliness Scale, specifically developed for large surveys (Hughes, Waite, Hawkley, & Cacioppo, 2004) and by using a large nationally representative panel dataset. Furthermore, this study will build upon the existing literature to investigate the relationship between social isolation and feelings of loneliness and their independent effects on the health of older adults. The primary objective of this study is to better understand whether social isolation and feelings of loneliness are independently associated with health in older adults. A second goal is to explore the relationship between social isolation and feelings of loneliness.

Method

Data and Sampling

Data from both the 2006 and 2008 waves of the Health and Retirement Study (HRS) were used for this study. The HRS is a cohort panel study that began

in 1992 and continued with data collection every 2 years afterwards. A multistage probability sampling design was utilized for the HRS to provide a nationally representative sample of older adults aged 50+ in the United States using in depth interviews. Detailed demographic information is collected as well as physical and mental health information, social interaction and labor force participation data.

Due to the variables of interest in this study, only respondents who completed the Leave Behind Questionnaire (LBQ) in each wave were retained in the sample. The LBQ is a self-administered questionnaire that was left with a representative subsample of respondents upon the completion of an in-person core interview. Note that the subsample of participants who completed the LBQ in 2006 is different from those respondents who completed it in 2008. As a result, this cross-sectional sample was a combination of those persons who completed the LBQ in either the 2006 or 2008 waves of the HRS and had no missing response data.

In addition, the sample does not include nursing home residents or proxy respondents. They are excluded because they have unique social resources and are significantly different from the rest of the population. After applying these exclusion criteria, the total sample was 11,825 adults. Mean comparisons between those with missing data and the retained sample showed only modest differences between those respondents with missing data and those respondents with no missing data. Those who were dropped due to missing data and those retained in the sample differed on the following: Persons lost to missing data were older (70.96 vs. 67.67 years; $p<.001$) than the sample retained and those who remained in the sample had fewer functional limitations (3.72 vs. 4.47 functional limitations; $p<.001$) and on the dependent variables a smaller proportion rated their health as not fair/poor ($p<.001$).

Dependent Variables

The dependent variables were self-reported physical and mental health. Self-reported health was made binary by measuring fair/poor health and good/very good/excellent as two groups. Self-ratings of health have been shown to be a reliable measure of physical health status (Idler & Benyamini, 1997). Mental health was determined by one question: "Has your doctor ever told you that you have an emotional or psychiatric problem?" This is a global indicator of emotional or mental health problems. We recognize that many older adults do not seek counseling or psychiatric care and mental health problems are underdiagnosed by providers. Thus, this item may underestimate the actual level of emotional/psychiatric problems. However,

we believed it important to include even an imperfect measure of global mental health because both social isolation and loneliness have been linked to mental health (Kawachi & Berkman, 2001).

Independent Variables

Based on the work of Cornwell & Waite (2009) Social Isolation was measured using a 10-item scale ($\alpha = .73$). The 10 items included a numeric count of the number of child, family and friend relationships. Also the frequency of contact with children, other family members and friends was included in the social isolation scale (3+ times per week, 1 or 2 times per week, 1 or 2 times per month, 1 or 2 times per year, or less than 1 time per year/never). To measure participation in social activities, the scale included frequency of church attendance, attendance at events held by the groups a person is a member of (daily, several times per week, 1 time per week, several times a month or not at all in the last month) and whether or not a person volunteered; finally a count of persons coresiding with the respondent was included in the social isolation scale. In order to standardize the scale, z-scores were computed for each variable and the mean standardized social isolation score was calculated for each respondent. Scores on the scale range from −4.98 to 1.12 with a mean of 0.012 and a standard deviation of 0.405. Lower scores indicate greater levels of social isolation.

The other main independent variable in this study was loneliness; in order to measure this variable the Hughes et al. (2004) 3-Item Loneliness Scale ($\alpha = 0.82$) was used. Respondents were asked, "How often do you feel that you lack companionship?" "How often do you feel left out?" and "How often do you feel isolated from others?" Answers were either often, some of the time or hardly ever, or never. The total score, which can range from 3 to 9 with a mean of 4.395 and a standard deviation of 1.642, is the sum of the 3-item responses; the higher the scores, the more frequently feelings of loneliness occurred.

Several demographic factors have been found to be associated with loneliness and social isolation and were control variables in this study (see Table 1). Age is a continuous variable and was calculated in years. Age is expected to have a negative impact on health. Gender, marital status, and race were coded as dummy variables. Although women live longer, they also experience a higher prevalence of disability and chronic conditions (Orfila et al., 2006). Race was measured as white non-Hispanic or other (Hispanic, Black non-Hispanic, and Asian). Current literature has pointed to significant health disparities across racial groups particularly African American and Hispanic (Banerjee, Perry, Tran, & Arafat, 2010), it is expected that compared to non-Hispanic Whites,

Table 1. Description of Dependent and Independent Variables

Variable	*M*	*SD*
Self-reported fair/poor health	0.255	0.436
Mental health problem	0.166	0.372
Loneliness	4.395	1.642
Social isolation	–0.013	0.406
Age	67.67	10.312
Female	0.594	0.491
Non-Hispanic White	0.854	0.353
Married	0.643	0.479
Education	12.804	2.967
Working for pay	0.393	0.488
CES-D score (loneliness item omitted)	1.524	1.742
Functional limitations count	3.725	3.064
Smoking	0.134	0.341
Drinking	0.530	0.499
Body mass index	28.272	5.91

Note: CES-D = Center for Epidemiological Studies-Depression Scale.

other race groups will experience worse health outcomes. Marital status was included as a control variable and was measured as persons with a spouse/partner versus other marital statuses. People with a partner relationship are generally more likely to seek medical treatment and engage in less risky health behaviors (Uchino, 2006). It is expected that persons who are in the married group will report better health outcomes. Whether or not the respondent was currently working for pay was also included as a control variable. Persons who are working are more likely to have regular social interaction at work.

Because mental health diagnosis and self-rated health are greatly affected by health behaviors and function, measurements of health were included as covariates. Twelve items were available to construct the functional limitations variable including measures of mobility such as climbing stairs, stooping, and walking several blocks. It is expected that higher counts of functional limitations will be associated with worse self-reported health, mental health. Depression has been linked to loneliness and also related to negative health outcomes, the same is expected in this study. To assess the presence of depressive symptoms, a variable was constructed using an 8-item form of the CES-D (Andresen, Malmgren, Carter, & Patrick, 1994). Respondents were asked to indicate how often they experienced several feelings during the past

week. One item on the shortened CES-D asks whether respondents felt lonely during the past week, and loneliness is already measured by the Hughes scale, so this item was removed from the scale. This approach is commonly used to avoid item overlap in the analysis (Cacioppo et al., 2006). Following Cornwell and Waite (2009), this revised version of the CES-D decreases the scales internal consistency ($\alpha = .80$ to $\alpha = .78$).

Measures of whether or not a person currently smokes or drinks were included in the model. Previous research has established that moderate levels of alcohol consumption (consuming two or fewer drinks per day, has been associated with positive outcome measures of well-being (Ostbye, Taylor, & Jung 2002), better cognition and reduced risk of significant cognitive decline (Espeland et al., 2005), as compared to other levels of drinking behavior. Alcohol has also been causally related to more than 60 different medical conditions (Room, Babor, & Rehm, 2005), therefore in this study it is expected that alcohol consumption will be associated with worse health with the exception of moderate drinking, which will be positively associated with health. It is expected that people who smoke currently or who previously smoked will have more negative health outcomes than there nonsmoking counterparts. Body Mass Index (BMI) was calculated using the respondent's height as reported at the time of the first interview and weight recorded at the time of interview in 2006 and 2008. Obesity increases all-cause-mortality (Arterburn, Crane, & Sullivan, 2004) and contributes to a higher risk of Type 2 diabetes, hypertension, cardiovascular disease, pulmonary diseases, and osteoarthritis (Doshi, Polsky, & Chang, 2007).

Data Analysis

Logistic regression was used to estimate the effect of loneliness and isolation on self-reported fair/poor health status and presence of a mental health problem. The model included control variables for functional limitations, employment, health behaviors, and demographic variables. In addition, the same covariates were included in separate multiple regression models in which social isolation and loneliness were the dependent variables. The statistical package used for the analysis was STATA 10.

Results

Descriptive Statistics

Descriptive statistics for the study sample are reported in Table 1. The sample population consisted of an average age of 67.7 years, and respondents

had an average formal education level of about 12.8 years. Whites made up about 79% of the sample. A majority of the sample was married (64%) and there were slightly more females (59%) than males in the sample. Approximately 16.6% of the sample reported having a mental health problem and the average number of chronic conditions for the sample was 1.96 conditions. Approximately 25% of the sample reported their health as being fair/poor and on average respondents reported having about 3.7 functional limitations. Depressive symptoms for this sample averaged at about 1.5 symptoms. Finally, 43.5% of this sample never smoked, about 53% do not drink alcohol, and the average BMI for this sample was 28.3. The mean score on the loneliness scale for this sample was 4.395 (Standard Deviation [*SD*] 1.64) and the mean social isolation scale score was −0.12 (*SD* −0.405). Loneliness and social isolation were not highly correlated with one another ($r = 0.201$, $p = 0.000$).

Multivariate Results

Tables 2 and 3 contain the results of the logistic regressions for each dependent variable. Bivariate correlations between all pairs of independent variables were examined and variance inflation factors were computed to diagnose potential multicollinearity among multiple variables. Stepwise regression models were run for each model to test the robustness of the empirical results. The results showed that the empirical results are robust and are not threatened by multicollinearity problems.

Self Rated Health

Table 2 contains the results of the logistic regression on self-rated health. Three models are represented in this table, the first includes the loneliness scale variable, the second included the social isolation variable and the third model included both of them together. As predicted, the findings in Table 2 indicate that when social isolation and loneliness were modeled separately they both had a relationship with fair/poor health (*OR*: 1.41; CI: [1.23-1.61]; $p<0.000$ and *OR*: 1.03; CI: [1.00-1.07]; $p<0.05$), respectively. However, when both independent variables were included, one significant relationship remained. Consistent with the expectations that older adults who were socially isolated would have poorer health outcomes, the findings in Table 2 suggest that the odds of rating one's health as being fair/poor are 39% higher for persons who had higher scores on the social isolation scale (CI: [1.21-1.59], $p< 0.000$), even when loneliness was included in the regression model.

Table 2. Logistic Regression Results: Fair/Poor Health Status

	Loneliness *OR* [95% CI]	Isolation *OR* [95% CI]	Both *OR* [95% CI]
Loneliness	1.03 [1.00-1.07]*		1.02 [0.988-1.06]
Social isolation		1.41 [1.23-1.61]***	1.39 [1.21-1.59]***
Age	0.986 [0.980-0.992]***	0.986 [0.980-0.992]***	0.986 [0.980-0.993]***
Female	0.496 [0.443-0.556]***	0.510 [0.455-0.572]***	0.533 [0.471-0.603]***
Race	0.672[0.582-0.776]***	0.645 [0.558-0.745]***	0.646 [0.559-0.746]***
Marital status	0.881 [0.785-0.989]*	0.903 [0.805-1.01]	0.914 [0.813-1.03]
Education	0.880 [0.864-0.896]***	0.879 [0.863-0.895]***	0.880 [0.864-0.896]***
Working for pay	0.586 [0.514-0.668]***	0.585 [0.513-0.667]***	0.584 [0.512-0.666]***
CES-D score	1.42 [1.37-1.46]***	1.42 [1.38-1.47]***	1.41 [1.37-1.46]***
Functional limitations	1.376 [1.35-1.40]***	1.38 [1.35-1.40]***	1.38 [1.35-1.40]***
Smoking	1.37 [1.18-1.60]***	1.34 [1.15-1.56]***	1.34 [1.15-1.56]***
Drinking	0.718 [0.64-0.80]***	0.711[0.638-0.793]***	0.711 [0.638-0.793]***
Body mass index	0.994 [0.985-1.00]	0.994 [0.985-1.00]	0.994 [0.985-1.00]

Note: CES-D = Center for Epidemiological Studies-Depression Scale.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 3. Logistic Regression Results: Mental Health

	Loneliness *OR* [95% CI]	Isolation *OR* [95% CI]	Both *OR* [95% CI]
Loneliness	1.17 [1.13-1.21]***		1.17 [1.13-1.21]***
Social isolation		1.10 [0.956-1.23]***	0.992 [0.864-1.14]***
Age	0.955 [0.949-0.961]***	0.954 [0.947-0.960]***	0.955 [0.949-0.961]***
Female	1.72 [1.53-195]***	1.17 [1.52-1.93]***	1.72 [1.53-1.94]***
Non-Hispanic White	1.86 [1.58-2.19]***	1.84 [1.56-2.16]***	1.87 [1.58-2.20]***
Marital status	0.766 [0.682-860]***	0.707 [0.630-.794]***	0.765 [0.681-0860]***
Education	0.995 [0.976-1.01]	0.992 [0.973-1.01]	0.995 [0.976-1.01]
Working for pay	0.682 [0.596-0.780]***	0.682 [0.596-0.780]***	0.682 [0.596-0.780]***
CES-D score	1.30 [1.26-1.34]***	1.36 [1.32-1.40]***	1.30 [1.261.34]***
Functional limitations	1.12 [1.09-1.14]***	1.12 [1.11-1.14]***	1.12 [1.09-1.14]***
Smoking	1.14 [0.983-1.33]	1.14 [0.984-1.33]	1.14 [0.983-1.33]
Drinking	0.862 [0.770-0.965]**	0.863 [0.772-0.966]**	0.862 [0.770-0.965]**
Body mass index	0.991 [0.982-1.00]	0.992 [.983-1.00]	0.991 [0.982-1.00]

Note: CES-D = Center for Epidemiological Studies-Depression Scale.
**$p < .01$. ***$p < .001$.

Mental Health

Table 3 contains the results of the logistic regression on the presence of a mental health problem. Three models are represented in this table, the first includes the loneliness scale variable, the second included the social isolation variable and the third model included both of them together. Log likelihood tests were also run to compare the model fit across models. Results (not

shown) indicated that the constrained models had significantly better model fit than the unconstrained model that included both isolation and loneliness. People reporting loneliness had 17.0% higher odds of having a mental health problem present (CI: [1.13-1.21], $p<0.000$). This is consistent with theoretical expectations, that feelings of loneliness are particularly deleterious for mental health outcomes.

In supplementary analyses (not shown) additional multiple regression models were run with loneliness and social isolation as dependent variables. Similar results were found, supporting our conclusion and the robustness of the associations. After controlling for all covariates, self-rated fair/poor health was significantly related to social isolation ($b = 0.05$; $p<0.000$; $r^2 = 0.09$) and reporting a mental-health diagnosis was significantly related to loneliness ($b = 0.41$; $p<0.000$; $r^2 = 0.20$). This provides convincing evidence of the association of both psychosocial constructs with self-rated health and mental health.

Discussion

The purpose of this research was to identify whether social isolation and feelings of loneliness are independently associated with health in older adults and to explore the relationship between social isolation and feelings of loneliness. These two constructs have been related to health risks in older adults and yet are rarely studied together. We expected to find unique relationships between both social isolation and feelings of loneliness on health outcomes because of the growing scientific evidence showing that loneliness and social isolation are related to health outcomes when examined separately.

Interestingly, the analyses confirmed that loneliness and isolation are not highly correlated with one another ($r = 0.201$; $p = 0.000$), which supports our contention that the two constructs are distinct. Loneliness is a more subjective emotion whereas social isolation has more objective components; and the findings support this conceptualization. This research measured social isolation and perceived feelings of loneliness as forms of subjective and objective variables, which contributes to the low correlation. This low correlation also implies that social isolation is not always accompanied by feelings of loneliness, although the two are closely related. This builds on previous research which has used a variety of conceptualizations of social isolation by consolidating multiple aspects of social isolation into these two forms: Social isolation and feelings of loneliness. Thus, past research that has relied on a single item global measure of loneliness may have missed these conceptual distinctions and their unique consequences. Our confidence in these results was supported through the sensitivity analysis

conducted with running regression models predicting loneliness and social isolation and loneliness. The findings held that unique and significant relationships between social isolation, loneliness and both health outcomes exist.

Another contribution of this study is to the conceptualization of social isolation and loneliness. Both constructs have been defined in many ways with a variety of distinctions (loneliness, isolation, perceived isolation, limited social network, disconnectedness, and level of social integration). Some researchers argue that social isolation and these feelings of loneliness should be treated as separate constructs altogether (Cornwell & Waite, 2009) while others view loneliness as just one type of isolation (Weiss, 1973) and still others define loneliness as one potential side effect of social isolation (Nicholson & Nicholson, 2009). These numerous definitions of social isolation lack clarity, uniformity and consistency in definition or measurement. This conceptual ambiguity poses real challenges to developing the knowledge and generating testable hypotheses in this area of research. The study presented here advances our knowledge of social isolation and loneliness by understanding the two are separate constructs and should not be measured as one.

The main effects of social isolation are similar regardless of whether loneliness was controlled for or not. This was verified by the log likelihood test. The constrained models had a better fit than the models which included both variables together. Loneliness does not appear to mediate the direct effect of isolation on self-reported health. This is congruent with other hypotheses, which point to both a structure and function of social networks (House, 2001; Uchino, 2006). The presence of social network members (structure), objectively, can lead to access to health resources and the social accountability for partaking in positive health behaviors and comply with medical regimes (Berkman, Glass, Brissette, & Seeman, 2000). In addition, the findings from this study find that loneliness is most strongly related to mental health and social isolation with self-reported health. This could support the notion that feelings of loneliness (function) can lead to triggering the stress process and contributing hormonally and psychologically to health. While it is known that mental health and physical health are closely related, these results do not suggest that loneliness and isolation have a causal relationship, but rather that they have independent pathways to health.

The implications of our findings for policy are interesting. A growing emphasis in service delivery is on community-based, in-home care and aging in place. However, we wonder if an unintended consequence of aging in place for some older persons may be an increased risk for social isolation. Our results reinforce the need to minimize risks for loneliness and social isolation to maximize health outcomes.

Social isolation is modifiable, thus there is an opportunity for creative programs and interventions to foster social connections for older adults. For example, volunteer friendly visiting programs, psychosocial group rehabilitation, or the use of technology for social networking are approaches that have been used successfully. These types of interventions have been effective in connecting isolated adults to new network members, inducing feelings of "being needed," and increasing well-being (Routasalo, Tilvis, Kautiainen, & Pitkala, 2009). We note that the provision of social relations does not always balance the discrepancy between desired and actual levels of social interaction, or feelings of loneliness (Rook, 1984) and these limitations should be considered when designing interventions.

Ameliorating feelings of loneliness is more complex, but by reducing social isolation through the provision of social connections, there is a greater possibility to develop emotionally satisfying relationships and thereby reduce feelings of loneliness. Innovative interventions for social isolation and loneliness should be piloted and evaluated because of the magnitude of the health risks. Interventions targeting loneliness and isolation could potentially be cost-neutral. This is due to the potential pay-offs in health care costs that would otherwise occur. Furthermore, many current efforts to reduce social isolation in the community rely heavily on volunteers, which could also maintain low costs.

The present study showed independent risks for health associated with both social isolation and loneliness. Previous researchers have noted that the magnitude of this association between isolation, loneliness and health rivals that of smoking or obesity on health (House, 2001). Aging often brings changes in social relationships as individuals retire, lose integral network members and experience health changes, thus the importance of further knowledge about isolation and loneliness is very important to alleviating these negative health consequences.

Limitations

Despite these findings, there were a few limitations to this study. First, this study is limited by its cross-sectional data eliminating any possible causal inferences. Based on findings from our supplementary analyses, it was not possible to determine the direction of the independent relationship between social isolation, loneliness and health; however it is clear that a relationship does exist. In addition, the logistic regression does not allow us to speak to the amount of variance explained. Generally speaking, the amount of variance that is explained by psychosocial variables (specifically loneliness and isolation) is small to begin with. Second, social desirability bias may have

led to underreporting of loneliness and social isolation. Finally, many people do not always receive a formal diagnosis of mental health problems, which could make reliance on a self-report measure of mental health diagnosis by a physician questionable in that it could be an underestimation of older adults living with mental illness. Despite these limitations, the current study contributes to the literature and provides a basis for future research.

Future Research

Future research that investigates, longitudinally, both social isolation and emotional loneliness with clinical health outcomes is needed. This work should include both social isolation and feelings of loneliness but measured as separate variables. Specifically, identifying the possible mechanisms through which these two unique constructs impact the health of older adults is needed. By refining the definition of these concepts and presenting more causal mechanisms (i.e., physiological responses etc.), policymakers and researchers will better understand and measure the costly health risks associated with social isolation and loneliness among the older population. Future research should also take into account other risk factors that are more specific to various populations. For example, a similar concept that is not mutually exclusive of social isolation and loneliness is that of linguistic isolation. Often people who report linguistic isolation are at risk of social isolation and feelings of loneliness as well.

Older adults with low levels of education, lower income, and more functional limitations are also at high risk of experiencing the negative consequences of isolation, including poor health outcomes, limited access to resources, and less people living in the household (Theeke, 2010). In addition, several sociodemographic indicators were found to affect the likelihood of having poor health outcomes in this study. While this study showed the significance of social isolation and loneliness in a nationally representative population, other subgroups may be particularly at risk for social isolation and loneliness. Women are also most likely to be widows and live alone, both of which are serious risk factors for social isolation. Therefore, it is of utmost importance to examine these subgroups in greater detail; and these populations should be a priority to target for interventions.

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