



HHS Public Access

Author manuscript

J Gerontol Soc Work. Author manuscript; available in PMC 2019 December 31.

Published in final edited form as:

J Gerontol Soc Work. 2018 ; 61(6): 623–639. doi:10.1080/01634372.2018.1478352.

Loneliness in Senior Housing Communities

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INTRODUCTION

In the face of population aging, loneliness in later life is of growing concern, with estimates that 19% to 29% of community-dwelling older adults are lonely (Ong et al., 2015; Hawkley, Kozolowski, & Wong, 2017). Loneliness can be defined as “the psychological embodiment of social isolation, reflecting the individual’s dissatisfaction with the frequency and closeness of their social contacts or the discrepancy between the relationships they have and the relationships they would like to have” (as seen in Steptoe et al., 2013). Older adults have lower frequency of contact with friends and family and have smaller social networks in comparison to younger adults (Cornwell et al., 2008), due to losses in family members, and/or adult children who move away. These realities place older adults at greater risk for loneliness. Loneliness is associated with negative health and well-being outcomes, including mortality (Luo et al., 2012), functional decline (Perissinotto et al., 2012), depression (Cacioppo et al., 2006), the presence of a mental health disorder (Coyle & Dugan, 2012), lower sleep quality (Cacioppo et al., 2002), and cognitive decline (Shankar et al., 2013). With the growing awareness of its negative health and well-being effects, loneliness is now considered a major public health issue to be addressed among older adults (Gerst-Emerson & Jayawardhana, 2015; Elder & Retrum, 2012).

Most studies of loneliness among older adults have been conducted among community-dwelling older adults residing in single-family homes or non-subsidized apartment complexes (which we refer to as *conventional* in this writing) (Shiovitz-Ezra & Leitsch, 2010) and not specifically among individuals residing in low-income independent housing complexes for older and disabled adults. (We used the term senior housing communities for the purposes of this manuscript. We use the term to mean subsidized housing developments where low-income older adults, aged 62 and older generally qualify to rent; and not including continuing care retirement communities, assisted living facilities, or nursing homes). It would seem that loneliness could be significantly lower in these senior housing complexes. This assumption, although not substantiated, stems from the fact that residents are embedded in communities with peers, there are occasional activities and support from senior housing management, there is common space to meet, and often the buildings are close to public transportation (Taylor et al., 2016, Dupuis-Blanchard, Neufeld, & Strang, 2009).

On the other hand, rates of loneliness could be higher in senior housing communities in comparison to community-dwelling older adults because residents experience higher levels of risk factors associated with loneliness. This includes having lower income, being single (as opposed to being married or partnered), and having greater health and mental health vulnerabilities (LeadingAge, 2010; Shin, Sims, Bradley, Pohlig, & Harrison, 2014; Gonyea et al., 2016; Robinson et al., 2009). Additionally, residents may have relocated away from their family and friends. Thus, the prevalence and correlates of loneliness could be different among residents of senior housing communities in comparison to their counterparts outside of residential facilities. This paper contributes to the scant knowledge base on loneliness in senior housing communities by addressing these research questions: 1) What is the prevalence of loneliness in senior housing?; and 2) What factors are associated with loneliness in senior housing?

BACKGROUND LITERATURE

Senior Housing Communities

As of 2014, there were approximately 2 million adults aged 62 or older in the United States who live in either public housing or federally subsidized rental properties (Gonyea, Curley, Melekis, Levine, & Lee, 2016; Joint Center for Housing Studies of Harvard University, 2014). People move to senior housing for various reasons, including financial assistance, support with frailties, more social connection, and improved housing quality and security (Redfoot & Kochera, 2005). Older adults and disabled adults living in low-income senior housing are vulnerable in regards to income, health and mental health, and social relationships (LeadingAge, 2010; Gonyea et al., 2016). In general, older renters (including those residing in senior housing communities) report an average annual income of \$10,000 per year (Gonyea et al., 2016); and they are more likely to live alone, have greater functional difficulties (Redfoot & Kochera, 2005), worse self-rated health, and a higher prevalence of chronic medical and psychiatric conditions (Parsons et al., 2011; Robinson et al., 2009; Cotrell & Carder, 2010) compared to older adults who are not renters. These economic, health, and social factors place senior housing residents at greater risk for loneliness.

Loneliness in Senior Housing Communities

There are a few studies that address loneliness in a senior housing or similar context. Plouffe and Hill (1996) found loneliness was negatively correlated with family visits, talking to the family over the telephone, neighbor visits, talking to friends and neighbors over the telephone, and frequency of social outings. They also found loneliness was negatively associated with frequency of exercise, perceived health status, energy level while it was positively associated with impaired functioning, number of days sick, using drugs to “calm nerves,” and using drugs “to sleep.” Gonyea and colleagues (2016) found one out of every three older adults in senior high rise buildings, including multifamily units, reported loneliness as part of their experience growing older. They also found that loneliness was a major predictor of depressive symptoms in their sample, accounting for 23% of the variance in depressive symptoms. Bekhet and Zauszniewski (2012) found loneliness was associated with greater anxiety and depressive symptoms in a retirement community.

Associative Factors

There are mixed findings regarding the association between age and loneliness (Cohen-Mansfield et al., 2016); some studies have found no association between age and loneliness (Theeke, 2009; Hawkley et al., 2008), others have found loneliness increases with age (Fees et al., 1999; Wenger et al., 1996), others have found loneliness decreases with age (Victor et al., 2005; Wilson & Moulton, 2010), and lastly, Pinquart and Sörensen (2001) found age has a curvilinear relationship with loneliness. Some studies have found women were lonelier than men (Pinquart & Sörensen, 2001; Shiovitz-Ezra & Leitsch, 2010), while others have found no relationship between gender and loneliness (Theeke, 2009; Hawkley et al., 2008). Finally, in regards to education, some studies have found individuals with higher levels of education had reduced loneliness (Pinquart & Sörensen, 2001), while others have found no association (Shiovitz-Ezra & Leitsch, 2010).

Older adults with better health and mental health are less lonely (Wilson & Moulton, 2010). Worse self-rated health, worse subjective eyesight, greater motor impairment, greater number of chronic health conditions, elevated mental morbidity, and depressive symptoms (Shiovitz-Ezra & Leitsch, 2010; Theeke, 2009; Hawkley et al., 2008; Victor et al., 2005; Victor & Yang, 2012) have been related to increased loneliness. Depressive symptoms were found to have a reciprocal relationship with loneliness (Cacioppo et al., 2006).

Increased loneliness is frequently associated with less contact with friends and neighbors, decreased family social support, smaller and less supportive social networks, and less satisfaction with social network members (Shiovitz-Ezra & Leitsch, 2010; Hawkley et al., 2008; Pinquart & Sörensen, 2001). Lonelier people were less likely to volunteer (Wilson & Moulton, 2010).

To the investigators' knowledge, no studies have examined factors associated with loneliness among older adults residing in senior housing communities. That is, most studies on loneliness used community-dwelling samples not focused on subsidized senior housing buildings; and most study loneliness as a determinant of health outcomes. In this study, we focus on sample of older adults in public housing, and we study factors that are associated with loneliness as a dependent variable.

METHODS

This pilot project is a collaborative effort with the OASIS Institute, a national non-profit organization with programs across the United States dedicated to promoting health and wellness among older adults. The OASIS Institute received funding from the AARP Foundation to increase understanding of social isolation for the purpose of program development. The authors of this paper and staff from the Friedman Center for Aging at the Institute for Public Health at Washington University in St. Louis collaborated with the OASIS Institute to assess the extent and correlates of social connections in senior housing communities that they served. The purpose of this study was purely to survey residents on their social connections, and it did not involve testing any of the programs or interventions developed by OASIS.

Data were collected in three senior housing communities in St. Louis, Missouri identified by the OASIS Institute because of their strong partnership. Two of the three complexes were in urban neighborhoods, and the last was located in suburban neighborhood. Additionally, all were publicly funded under Section 202 Supportive Housing for the Elderly Program. Residents qualify to live in this subsidized housing by virtue of age (62+) or disability and low income. Each facility has a primary housing manager. Two facilities were approximately the same size (60-70 residents) while the other complex was twice as big (135 residents). The third housing complex was different in that disabled younger adults were also residents in the complex while the other buildings included only older adults. The vast majority of residents lived alone in their apartment across the three senior housing communities; in fact, during data collection, only two residents (an older married couple, who both completed the survey) lived together. All other residents lived by themselves in their apartment units. We did not collect more information about these three living environments, given the focus of our study. However, from the researchers' perspective, the larger size and mixture of younger and older residents affected the nature of the environment in that it seems less organized than the other two.

The OASIS Institute facilitated contact between the research team (consisting of graduate students, staff and faculty at the Friedman Center for Aging) and staff members at the housing communities to set up a meeting to review the purposes of the study, review procedures, and gain consent to survey the residents. Residents were recruited through flyer advertisements and announcements from senior housing staff. Senior housing staff members' role in the project was limited to advertising and encouraging participation; they did not take part in any data collection efforts. All residents in each of these three housing communities were invited to participate in the survey. Research team members received training for administering the surveys and interviews to senior housing residents.

At the first two of the housing sites, data were collected by pencil and paper surveys in a group setting in multipurpose room. Residents read a consent statement before beginning the survey; and they were instructed to not discuss the study with each other in order to protect confidentiality. Research team members assisted with completion and answered questions if requested. Average time to completion was 20-30 minutes. At the third housing setting, face to face interviews in private apartments (or in the service coordinator's office) were conducted because open-ended questions were added to the survey. Respondents agreed to participate verbally after hearing explanation about the study; and as per approval by the institutional IRB, no signed form consent was required. Average interview time was 30-60 minutes. Across all three data collection efforts, respondents could skip questions if they desired; and if they experienced any emotional distress from the study, they were informed that research team members would refer them to the service coordinator of the senior housing community who would help them access mental health services if needed. All residents who participated in the survey received a small gift card in recognition of their time (\$15 in the first two complexes and \$20 in the third). Study procedures were approved by Washington University in St. Louis' Institutional Review Board (IRB Number: 201308102).

The total number of residents in the housing sites was 267 (62, 70, and 135 residents, respectively), and a total of 148 completed the survey. One hundred and nineteen chose not to participate or provided insufficient information on the survey to be used for analysis. The response rates across the three communities were 82% (51 of 62 total residents), 70% (50 of 70 total residents), and 35% (47 of 135 total residents). The low response rate in the third facility may be due to the fact that the residents had to call the research team to set up an interview time. This requires more effort than procedures at the other sites where residents were invited to a common room at the specified time to complete the survey and enjoy snacks.

Variables

Dependent Variable: Loneliness—Loneliness was measured using the Hughes 3 item loneliness scale (Hughes et al., 2004), which has been used to study loneliness among older adults (Perissinotto et al., 2012; Hawkey et al., 2017; Shiovitz-Ezra & Leitsch, 2010; Taylor, Herbers, Talisman, Morrow-Howell, 2016; Shankar et al., 2011). Concurrent and discriminant validity have been established. Items were: 1) How often do you lack companionship?; 2) How often do you feel left out?; and 3) How often do you feel isolated from others? Response options were: 1-hardly ever or never, 2-some of the time, and 3-often. Items were combined into a single scale, with higher scores representing increased loneliness. The Hughes scale assessed current loneliness, yet in general, loneliness is viewed as a stable trait across the life course, varying according to an individual's circumstances and environments (Hughes et al., 2004). Additionally, we applied cut-off points developed by Musich and colleagues (2015) to classify people as non-lonely, moderately lonely, or severely lonely.

Independent Variables—Race was recorded as Black; White; Asian; American Indian, Alaskan Native, or Indigenous; Native Hawaiian or Other Pacific Islander; and Multiracial. In this study, all respondents self-identified as Black, White, or Multiracial. Respondents selected multiracial if they were of more than one race/ethnicity. Most respondents identified as Black, thus race was recoded to Black and Other in the multivariate analyses. Education was assessed with: 1) less than high school; 2) high school; or 3) some college or higher. Age and months living in senior housing were recorded.

Anxiety symptoms was measured using the five item Geriatric Anxiety Inventory Short Form (GAI-SF) (Byrne & Pachana, 2011). The Yes-No items were: 1) I worry a lot of the time; 2) Little things bother me a lot; 3) I think of myself as a worrier; 4) I often feel nervous; and 5) my own thoughts often make me anxious. Items were summed to create a single score, with higher scores indicating higher anxiety symptoms. The Cronbach's Alpha in our study was .78. Byrne and Pachana (2011) also found the GAI-SF has good concurrent validity. As per Byrne and Pachana's (2011) recommendation, respondents who scored 3 or higher on the GAI-SF were determined to have high anxiety symptoms while respondents who scored 2 or lower were determined to have low anxiety symptoms.

Depressive symptoms were measured using the Patient Health Questionnaire 2 (PHQ-2). The PHQ-2 consisted of two questions: Over the past 2 weeks, how often have you been

bothered by the following problems? 1) Little interest or pleasure in doing things?; and 2) Feeling down, depressed, or hopeless? The response are 0-not at all, 1-several days, 2-more than half the days, and 3-nearly every day. A summative measure was created so that higher scores represented greater depressive symptoms. The PHQ-2 was shown to have good construct and criterion validity, including older adults (Kroenke et al., 2003; Li et al., 2007). Respondents who scored a 3 or higher on the PHQ-2 were noted to have high depressive symptoms while respondents who scored a 2 or lower were determined to have low depressive symptoms.

Self-rated physical health was assessed with the following item: “In general, how would you rate your physical health?” The response categories were excellent, very good, good, fair, and poor. Self-rated physical health has been shown to be a strong and consistent predictor of mortality (Idler & Benyamini, 1997).

The social engagement variables include frequency of group meeting attendance and frequency of volunteering. Frequencies were collapsed into low, medium and high engagement (with low being less than once a year, about once or twice a year, and several times a year; medium being about once a month; and high being every week or several times a week).

Level of emotional support was assessed with a summative score based on four items, with a 3-point response option: 1) frequency of opening up to family to talk about your worries; 2) frequency of relying on your family if you have a problem; 3) frequency of opening up to your friends to talk about your worries; and 4) frequency of relying on your friends if you have a problem. Higher scores represent higher levels of emotional support. The Cronbach’s Alpha for this scale was .70. The second emotional support variable asked respondents how often do they talk to someone about things important to them, using a six-point scale, from 1) less than once a year to 6) several times a week or more.

Data Analyses

Descriptive statistics are presented for each individual housing community as well as for the combined samples. Differences between the sites were assessed by bivariate tests of association. A series of hierarchical multivariate regression analyses were then performed. In Model 1, loneliness was regressed on the sociodemographic variables with a second model adding health variables, a third model adding social engagement variables, and a fourth model adding emotional social support variables. All analyses were conducted in SAS version 9.4.

In the multivariate regression models, 52 of the 148 respondents had missing data, with the variable emotional social support having the most (14.8% of values was missing). Given the small sample size, we employed multiple imputation to complete the data set. Twenty data sets were completed, using the multivariate normal model approach, and the estimates were rolled up to determine the final parameters (UCLA Statistical Consultant Group, n.d.). Variance inflation, tolerance, and condition indexes were used to test issues of multicollinearity in the imputed data sets; no issues were found in any of the 20 imputed datasets.

FINDINGS

Descriptive Statistics

Please see Table 1 for more characteristics on the overall sample, as well as characteristics on each individual senior housing communities. When asked about their ethnicity, gender and marital status, the majority of the sample identified as being Black (81.6%), woman (76.6%), and single (92.4%). Most of the sample had obtained at least a high school diploma (69.7%). In regards to health and well-being, 17.3% of the sample had high anxiety symptoms, and 14.3% of the sample had high depressive symptoms.

Table 1 indicates that approximately 60% (n=86) of the sample felt like they lacked companionship either some of the time or often, approximately 40% (n=57) felt left out either some of the time or often, and 30% (n=45) felt isolated some of the time or often. The average score on the loneliness scale was 4.58 out of a possible score of 9; with 30.8% of the sample classified as non-lonely (having a score of 3), 42.7% moderately lonely (having a score of 4-5), and 26.6% severely lonely (having a score of 6-9).

Table 1 shows what resident characteristics are similar and what are different across the three residences. Sample differences may be due to the fact that the third complex is different in terms of size and mixture of older and younger adults. Additionally, sample differences may be due to low response rate in that complex as well. The sample respondents in the third complex were more likely to identify as white or multiracial, male, and were younger than respondents in the other two communities. Additionally, they also had more education, lived in the housing complex for a shorter periods of time, were more likely to be married or partnered, and had lower emotional support scores in comparison to the first and second communities. Given these differences, however, there was no significant differences in the three housing sites regarding residents' self-rated physical health, anxiety symptoms, and depressive symptoms. These sample characteristics might be related to the fact that disabled younger adults live in the building and some have aged in placed. The summative loneliness scale, used as the dependent variable in this study, did not differ across sites.

Multivariate Statistics

In Model 1, none of the sociodemographic variables were significantly related to loneliness. In Model 2, loneliness was significantly related to depressive symptoms ($b=.52$, $SE=.09$, $p<.001$). There was a marginally significant relationship with anxiety symptoms ($b=.18$, $SE=.09$, $p<.10$). As depression symptoms and anxiety symptoms increased, so did loneliness. In Model 3, loneliness was significantly related to depressive symptoms ($b=.57$, $SE=.09$, $p<.001$) and one of the social engagement variables, high group meeting attendance, was marginally significant ($b=-.46$, $SE=.27$, $p<.10$); older adults who had high group meeting attendance were significantly less lonely compared to those with low group meeting attendance. The relationship between loneliness and anxiety symptoms was further attenuated in the presence of the social engagement variables. In Model 4, social support variables were not related to loneliness, and their inclusion did not alter the relationship of

depressive symptoms ($b=.57$, $SE=.09$, $p<.001$) and high group meeting attendance ($b=-.46$, $SE=.27$, $p<.10$) to loneliness.

DISCUSSION

Loneliness is a significant public health threat to the well-being of older adults (Gerst-Emerson & Jayawardhana, 2015; Elder & Retrum, 2012), and most studies on loneliness studied it as a determinant of health outcomes in later life. However, to the investigators' knowledge, no studies have examined factors associated with loneliness in senior housing. Our exploratory study documents that loneliness is prevalent in the three senior housing communities surveyed. About 70% of the residents were classified as moderately or severely lonely. These rates are high in comparison to samples of older adults mostly residing in conventional homes/apartments, including Ong and colleagues (2015) and Hawkley and colleagues (2017) findings that 19-29% of older adults are lonely. These findings suggest that loneliness is more pervasive in senior housing communities, despite the fact that these older adults are living in a building with their peers, have a congregate meeting space, have support from senior housing management, have occasional programs and activities, and frequently have access to local public transportation (Taylor et al., 2016; Dupuis-Blanchard, Neufeld, & Strang, 2009).

In regards to associative factors, the strongest correlate of loneliness was depressive symptoms. To increase understanding of this finding, we conducted some additional analysis (not shown) in which loneliness was regressed on the same variables in the same models, with depressive symptoms removed. When depression was excluded, anxiety became the strongest correlate; and when depression and anxiety were removed, self-rated physical health became significant. Not until all mental and physical health variables were removed did social support and engagement variables come into significance. These findings demonstrate that loneliness in senior housing is strongly associated with mental health and physical health. These findings are similar to other studies that document the relationship of mental morbidity and loneliness (Victor et al., 2005, Gonyea et al., 2009; Cacioppo et al., 2006).

Although marginally significant, the relationship between group membership and loneliness is notable, given that it can guide intervention development. Findings suggest that when individuals participate weekly or more in some of group event, they report being less lonely. The cross-sectional analysis prevents a causal argument, but this association suggests that regular group engagement might mitigate loneliness and that lower levels of engagements may not be effective.

None of the socio-demographic variables in the regression models were associated with loneliness, in contrast to other studies in the general population. One potential explanation for this may be the homogeneity of the sample as well as the population of older adults in low-income senior housing. For example, in the literature, living alone and marital status are frequently associated with loneliness. Yet we could not include these variables in this analysis because most of the residents lived by themselves and were not married.

In sum, the findings of this study add to the literature on social and mental health disparities found in senior housing communities. Older adults living in senior housing may have less social support and be more isolated and lonely in comparison to older adults residing in conventional homes (Taylor et al., 2016, Gonyea et al., 2016; Redfoot & Kochera, 2005). Additionally, our study found 17.3% of these housing residents had high anxiety symptoms and 14.3% had high depressive symptoms, levels that are higher than older population estimates (WHO, 2017).

This study has limitations which deserve attention. The study was conducted in three senior housing communities in St. Louis, Missouri, so the generalizability of the findings is limited from that perspective. However, generalizability is enhanced by including three different complexes. Second, there were different rates of survey participation between the sites. Small sub-group sample size prevented analyses by housing complex to further elucidate differences by response rate or by nature of the environment. Third, loneliness is a stigmatized condition (Victor et al., 2005); therefore, there may be some social desirability bias in the current sample. Fourth, there may be selection bias as a previous study using a subset of this dataset found more isolated older adults living in senior housing communities are less likely to participate (Taylor et al., 2016); therefore, the actual rates of loneliness and isolation in senior housing could be higher than reported. Fifth, since this study is cross-sectional, there is an issue of endogeneity and lack of causal argument. The older adults in our study could have mental morbidities that lead to loneliness or they could have loneliness which leads to mental morbidities. Many of the independent variables in our study (including the mental health variables) are time varying, and more advanced longitudinal methods and analyses will be necessary to determine the temporal order of these relationships. Finally, the chronicity of the health and mental health status of residents is not considered in this cross-sectional design. For example, depression and anxiety could be more recent or could be chronic. As noted above, more sophisticated longitudinal designs are needed.

IMPLICATIONS FOR SOCIAL WORK PRACTICE

Recommendations for Senior Housing Coordinators

Loneliness is inherently different from social isolation in that it is more difficult to ascertain. It is often assumed loneliness and social isolation go hand in hand; however, previous studies have found they are weakly correlated with each other (Coyle & Dugan, 2012), and a resident could be feeling lonely even if they have a high frequency of contact of social contacts. Therefore, senior housing staff may need to have conversations with residents to ascertain their feelings of loneliness as well as other emotional problems. Given that loneliness is a stigmatized condition, residents may be reluctant to admit they are experiencing this condition; and on-going relationship between staff and residents may be important. There are numerous short and effective screening instruments for loneliness, depression and anxiety, including the short assessments used in this study, that staff could employ. Although this type of formal psychosocial assessment may be outside of the purview of the rental arrangements in these housing site, staff may find ways to use them

when people relocate to the facility and over time as they become established residents. Identifying loneliness may be the first step in seeking remediation.

In a review conducted for AARP, there are a range of interventions to address social isolation, including one-on-one meetings with professionals or volunteers, group meeting and activities, or community-focused efforts including modifying the social and physical environment (Elder & Retrum, 2012). Many of these interventions could be applied in senior housing settings to address loneliness. Specific to this study, we found that higher group meeting attendance was marginally significantly associated with less loneliness. Facilitating attendance in group activities and meetings is a challenge but also a clear way to increase opportunities for social contact (Masi et al., 2011). Senior housing communities could increase partnerships with local organizations to engage residents via programs and volunteer opportunities, as exemplified by the OASIS Institute.

Linking Mental and Physical Health Services in Senior Housing Communities

This study has found loneliness is often correlated with mental health disorders. If an individual has a high loneliness score, there is also a strong possibility they are struggling with mental health issues and physical health issues. Therefore, while addressing a resident's loneliness, it is also important to concomitantly address their mental health and physical health. There has been movement toward offering health and mental health services within residential settings, in various types of payment arrangements. Enhanced services, also known as service-enriched housing, has been defined as "living arrangements that provide health and/or social services in an accessible, supportive environment" (Pynoos, Liebig, Alley, Nishita, 2005, p.2). The services (e.g., nursing and health promotion, social service and health care coordination, and social and recreational opportunities) provided in publicly subsidized buildings for low-income older adults are shown to be beneficial to residents' health outcomes (Castle & Resnick, 2016), with specific evidences on improved social contact and activity level (Castle, 2008). Although the current services were designed with a more general focus on physical and mental health, we suggest that reducing loneliness in senior housing should be explicitly included given its high prevalence and negative health effects.

CONCLUSIONS

This study documents high levels of loneliness in senior housing communities in comparison to older adults residing in conventional homes, as well as the relationship of mental health and loneliness. For future research, additional studies with more representative and larger samples as well as longitudinal designs are needed to build knowledge about loneliness in senior housing communities. Senior housing communities currently serve some of the most vulnerable older adults. Given proximity and homogeneity of residents, congregate space and programming, and potentially trusting relationship with housing staff, these sites have great potential for mitigating loneliness and concurrently addressing depression and anxiety.

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Table 1.

Univariate Statistics Overall and by Senior Housing Community

Variable	Percentage or Mean (N or Standard Deviation) for all Housing Communities	Percentage or Mean (N or Standard Deviation) for Housing Community 1	Percentage or Mean (N or Standard Deviation) for Housing Community 2	Percentage or Mean (N or Standard Deviation) for Housing Community 3
Feeling a Lack of Companionship				
Hardly Ever or Never	40.3% (58)	39.6% (19)	38.8% (19)	42.3% (20)
Some of the Time	47.2% (68)	45.8% (22)	57.1% (28)	38.3% (18)
Often	12.5% (18)	16.6% (7)	4.1% (2)	19.2% (9)
Feeling Left Out[†]				
Hardly Ever or Never	60.7% (88)	58.3% (28)	58.0% (29)	66.0% (31)
Some of the Time	28.3% (41)	35.4% (17)	34.0% (17)	14.9% (7)
Often	11.0% (16)	6.3% (3)	8.0% (4)	19.2% (9)
Feeling Isolated[*]				
Hardly Ever or Never	69.0% (100)	81.3% (39)	62.0% (31)	63.8% (30)
Some of the Time	26.9% (39)	18.8% (9)	36.0% (18)	25.5% (12)
Often	4.1% (6)	0.0% (0)	2.0% (1)	10.6% (5)
Loneliness Scale	4.58 (1.50)	4.40 (1.36)	4.57 (1.41)	4.77 (1.71)
Race^{***}				
Black	81.6% (115)	95.7% (45)	91.8% (45)	56.8% (25)
White	12.8% (18)	4.3% (2)	4.1% (2)	31.8% (14)
Multiracial	5.0% (7)	0.0% (0)	4.1% (2)	11.4% (5)
Gender^{***}				
Male	23.4% (32)	4.1% (2)	17.1% (7)	48.9% (23)
Female	76.6% (105)	95.9% (47)	82.9% (34)	51.1% (24)
Marital Status[†]				
Married/Partnered	7.6% (11)	2.0% (1)	6.25% (3)	14.89% (7)
Not Married	92.4% (133)	98.0 (48)	93.75% (45)	85.11 (40)
Age^{***}	74.10 (9.65)	78.20 (8.35)	76.83 (8.73)	66.98 (7.82)
Months Living in Senior Housing[*]	64.28 (55.66)	70.53 (45.47)	74.02 (64.90)	47.41 (51.83)
Education[*]				
Less than High School	30.3% (44)	33.3% (16)	31.3% (15)	27.7% (13)
High School Diploma	34.5% (50)	35.4% (17)	47.9% (23)	21.3% (10)
Some College	27.6% (40)	27.1% (13)	20.8% (10)	36.2% (17)
Bachelor's Degree or Higher	6.2% (9)	4.17% (2)	0.0% (0)	14.9% (7)
Anxiety Symptoms				
High Anxiety Symptoms	1.05 (1.49)	1.09 (1.73)	0.92 (1.31)	1.15 (1.46)
Low Anxiety Symptoms	17.3% (24)	20.9% (9)	12.0% (6)	19.6% (9)
Low Anxiety Symptoms	82.7% (115)	79.1% (34)	88.0% (44)	80.4% (37)
Depressive Symptoms	1.07 (1.46)	0.96 (1.22)	0.85 (1.51)	1.40 (1.61)

Variable	Percentage or Mean (N or Standard Deviation) for all Housing Communities	Percentage or Mean (N or Standard Deviation) for Housing Community 1	Percentage or Mean (N or Standard Deviation) for Housing Community 2	Percentage or Mean (N or Standard Deviation) for Housing Community 3
High Depressive Symptoms	14.3% (20)	14.9% (7)	10.9% (5)	17.0% (8)
Low Depressive Symptoms	85.7% (120)	85.1% (40)	89.1% (41)	83.0% (39)
Self-Rated Physical Health	2.75 (0.99)	2.88 (0.84)	2.84 (0.91)	2.53 (1.18)
Group Meeting Attendance				
Low	38.5% (88)	40.8% (20)	31.3% (15)	43.5% (20)
Medium	28.7% (41)	32.7% (16)	31.3% (15)	21.7% (10)
High	32.9% (47)	26.5% (13)	37.5% (18)	34.8% (16)
Frequency of Volunteering				
Low	73.9% (105)	76.1% (35)	73.5% (36)	72.3% (34)
Medium	9.9% (14)	4.4% (2)	16.3% (8)	8.5% (4)
High	16.2% (23)	19.6% (9)	10.2% (5)	19.2% (9)
Emotional Support**	9.52 (2.09)	10.19 (2.08)	9.66 (1.66)	8.78 (2.21)
Talking to someone about things important to you	5.12 (1.25)	5.00 (1.33)	5.27 (1.18)	5.09 (1.27)

Note: Chi-square tests or ANOVA tests were run for each variable across the senior housing communities.

† represents statistical significance at the .10 level;

* represents statistical significance at the .05 level;

** represents statistical significance at the .01 level;

*** represents statistical significance at the .001 level.

Table 2.

Loneliness in Senior Housing Multivariate Regression Models

Variable	Model 1	Model 2	Model 3	Model 4
	Estimate (STE)	Estimate (STE)	Estimate (STE)	Estimate (STE)
Intercept	5.30 (1.39)	3.92 (1.11)	4.36 (1.15)	4.46 (1.32)
Race				
Black	----	----	----	----
Other	0.13 (0.39)	0.22 (0.30)	0.23 (0.29)	0.23 (0.30)
Gender				
Male	----	----	----	----
Female	-0.10 (0.37)	0.14 (0.30)	0.13 (.31)	0.13 (0.31)
Age	-0.01 (0.02)	0.00 (0.01)	-0.00 (0.01)	-0.00 (0.01)
Months Living In Senior Housing	0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)	-0.00 (0.00)
Education				
Below High School Education	----	----	----	----
High School Education	-0.12 (0.33)	-0.01 (0.26)	-0.02 (0.26)	-0.02 (0.26)
Some college or Higher Education	-0.14 (0.34)	0.08 (0.27)	0.13 (0.27)	0.13 (0.27)
Housing Community				
Senior Housing Community 1	----	----	----	----
Senior Housing Community 2	0.13 (0.32)	0.26 (0.25)	0.24 (0.25)	0.23 (0.25)
Senior Housing Community 3	0.20 (0.40)	0.01 (0.31)	-0.06 (0.32)	-0.07 (0.32)
Anxiety Symptoms	----	0.18 (0.09)[‡]	0.14 (0.10)	0.13 (0.10)
Depressive Symptoms	----	0.53 (0.09)^{***}	0.57 (0.09)^{***}	0.57 (0.09)^{****}
Self-Rated Physical Health	----	-0.10 (0.12)	-0.02 (0.12)	-0.02 (0.13)
Frequency of Volunteering				
Low	----	----	----	----
Medium	----	----	0.24 (0.39)	0.24 (0.39)
High	----	----	-0.37 (0.29)	-0.35 (0.30)
Frequency of Group Meeting Attendance				
Low	----	----	----	----
Medium	----	----	-0.42 (0.26)	-0.42 (0.26)
High	----	----	-0.46 (0.27)[‡]	-0.46 (0.27)[‡]
Emotional Support	----	----	----	-0.01 (0.06)
Frequency of Talking to someone about things important to you	----	----	----	0.00 (0.09)

Note:

[‡] represents statistical significance at the .10 level;

* represents statistical significance at the .05 level;

** represents statistical significance at the .01 level;

*** represents statistical significance at the .001 level