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Social activity decreases risk of placement in a long-term care facility for a prospective sample of community-dwelling older adults

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Abstract

The purpose of this study was to determine the role of modifiable factors in the risk of long-term care placement. Using data from a cohort of community-residing older adults ($n = 189$), we conducted a secondary analysis of the contribution of social activity, sleep disturbances, and depressive symptoms to the risk of placement. Analyses controlled for cognitive and functional impairment, age, and medical conditions. Within 5 years, 20% of participants were placed in a long-term care facility. Each unit increase in social activity was associated with a 24% decrease in the risk of placement (odds ratio [OR] = 0.763, $p = 0.001$, 95% confidence interval [CI] [0.65, 0.89]). Cognitive impairment (OR = 3.05, $p = .017$, 95% CI [1.23, 7.59]), medical conditions (OR = 1.22, $p = .039$, 95% CI [1.01, 1.47]), and age (OR = 1.101, $p = .030$, 95% CI [1.01, 1.20]) were also significant individual predictors of placement. Although many of the strongest risk factors for placement are not modifiable, older adults who engage in more social activity outside the home may be able to delay transition from independent living.

Keywords

social activity; nursing home placement; long-term care

Although long-term care facilities (nursing homes and assisted living facilities) provide an essential service for many older adults, placement is often a costly and undesirable outcome. Extending the time that older adults remain in the community setting could decrease personal and public financial burden (H. S. Kaye, Harrington, & LaPlante, 2010), and alleviate the projected shortage of available long-term care placements (Feng et al., 2011). Prolonging care in the community may also decrease the risk of negative outcomes for older adults that are associated with placement, such as loneliness (Pinquart & Sörensen, 2001), and malnutrition (Kaiser et al., 2010).

There is an extensive body of literature identifying long-term care placement risk factors among older adults, yet they are predominantly non-modifiable risk factors. A meta-analysis of 77 studies concluded that the strongest independent predictors of nursing home placement among regionally or nationally representative samples of older adults were cognitive impairment, functional impairment, and previous use of a nursing home (Gaugler, Duval, Anderson, & Kane, 2007). Additional risk factors identified in a more recent systematic review include age, self-reported health status, number of prescription medications, socioeconomic factors, and non-Hispanic white ethnicity (Luppa et al., 2010). The summation of these largely non-modifiable factors advances our understanding of who is at risk of placement, but not how to prevent or delay it.

Social activity has been identified as an essential domain of successful aging (Rowe & Kahn, 1987), and contributes to several important health outcomes. In particular, social activity decreases the risk of developing two of the most important predictors of long-term care placement: functional decline (James, Boyle, Buchman, & Bennett, 2011) and global cognitive decline (Wang et al., 2013). Although social inactivity has rarely been examined as a risk factor for placement (Pynnonen, Tormakangas, Heikkinen, Rantanen, & Lyyra, 2012), there are promising links between social activity and other modifiable factors that may contribute to risk of placement. Increases in social activity are associated with an improvement in depressive symptoms (Isaac, Stewart, Artero, Ancelin, & Ritchie, 2009), and sleep quality (Richards, Beck, O'Sullivan, & Shue, 2005). Recent evidence indicates that sleep disturbances may increase the risk of placement among community-dwelling older women (Spira et al., 2012), and there is some evidence that depression may be a risk factor for placement (Dorenlot, Harboun, Bige, Henrard, & Ankri, 2005; Luppa et al., 2010). The interrelatedness of social activity, cognitive and functional decline, depression, and sleep in older adults underscores the importance of simultaneously examining diverse aspects of late-life, and in doing so we may identify factors that individuals could choose to modify.

The purpose of this study was to determine the role of modifiable factors in the risk of placement in a long-term care facility, focusing on social activity, sleep disturbance, and depressive symptoms.

Methods

Study Site and Participants

The data for this secondary analysis were derived from the Intelligent Systems for Assessing Aging Changes (ISAAC) study, a prospective cohort of community-residing older adults

living independently in the Portland, Oregon metropolitan area. The protocol was approved by the Institutional Review Board at a university located in the Pacific Northwest, and written informed consent was obtained from all participants prior to enrollment. The ISAAC study's project goals involve in-home monitoring of physical and cognitive activities; thus, the inclusion criteria were average physical health for age and no current dementia diagnosis. Exclusion criteria were physical limitations that interfered with monitoring systems and terminal medical conditions. Complete details of the study procedures are published elsewhere (J. A. Kaye et al., 2011). Table 1 describes the timing of enrollment, data collection and placement/other attrition among the sample.

From the 229 participants eligible for analysis, 40 participants were enrolled as a member of a couple. One member of each couple was dropped at random to avoid violating the independence assumption underlying the statistical methods employed in this study. Thus, the sample for this study included 189 older adults (mean age 83.6 ± 5.5) living in retirement communities (81%) and private residences (18%). Two participants were deemed to be living independently within an assisted living facility (1%). The sample was mostly female (78%), well educated (mean years = 15.2 ± 2.6), and white ethnicity (Black = 17%, Asian = 4%), with a low rate of mild cognitive impairment (14%) at baseline.

Measures

Long-term care placement outcome—This study focused on permanent transitions out of independent living. Any change in residence that included a permanent move to a long-term care facility, whether it resulted in assisted living or nursing home placement, was recorded as long-term care placement. Participants who increased level of care two times were only counted as being placed once upon their first transition. For the participants who transitioned to a long-term care facility, only the data collected prior to the date of placement were used in the analysis for this study.

Social activity—This measure assesses engagement in social activities outside of the home, and was adapted from the Brief Assessment of Social Engagement (BASE) scale (Morgan, Dallosso, & Ebrahim, 1985). In the xxx study, the five items of the BASE scale were rated on the basis of frequency (0 = rarely or never, 1 = yearly, 2 = monthly, 3 = weekly, 4 = daily) and included travel out of town, attending religious events, attending clubs or group events, visiting friends/family, and eating out. Items were summed to create a total score ranging from 0 to 20. Cronbach's alphas for this study (calculated at each of 5 time points) were between 0.57 and 0.78.

Sleep disturbance—The Sleep Disturbance Symptom Questionnaire (SDSQ) assesses the frequency and prevalence of sleep disturbance symptoms in older adults using 20 items such as heavy snoring and restless legs (Tractenberg, Singer, & Kaye, 2005). Participants choose the frequency that they experience the symptom (0 = never, 1 = seldom, 2 = occasionally, 3 = frequently, 4 = always). Responses were recoded according to the method described by Tractenberg et al. (2005) to create an endorsement (prevalence) score for each symptom. Responses of 0 or 1 were coded as 0 (not endorsed) and responses of 2, 3, or 4 were coded

as 1 (endorsed). The 20 items were then summed for a scale range of 0 to 20. Cronbach's alphas for the SDSQ in this study were between .74 and .76.

Depressive symptoms—Depressive symptoms were assessed with the Geriatric Depression Scale (GDS) short form (Sheikh & Yesavage, 1986). The short form version of the GDS includes 15 dichotomous items scored either 0 or 1. An example item is: “Do you feel that your life is empty?” Items were summed to create a total score ranging from 0 to 15. Cronbach's alphas for this study were between .68 and .79.

Functional impairment—Participants completed a 9-item measure of activities of daily living (ADLs) adapted from the Older Americans Resources Scale (OARS) (Fillenbaum & Smyer, 1981). Items included walking, eating, dressing, combing/shaving, bathing/showering, getting in and out of bed, toileting, continence, and shopping or getting around. Response choices are on a 3-point scale (0 to 2) that include no assistance needed, slight assistance needed, or full assistance needed. The items were summed for a scale range of 0 to 18 (higher indicating more impairment). Cronbach's alpha for each of 5 time points were .52; .82, .92, .90, .91. At time 1 (alpha= .52), two items were constant across all observations and excluded from the alpha calculation.

Medical conditions—Medical conditions were assessed at each annual visit using the Cumulative Illness Rating Scale for Geriatrics (CIRS-G) (Parmelee, Thuras, Katz, & Lawton, 1995). The CIRS-G includes 14 categories of medical conditions for which each is assigned a score of 0 (no problem) to 4 (extremely severe/immediate treatment required). The scale thus ranges from 0 to 56, with higher scores indicating more medical conditions of greater severity. A clinician completed the CIRS-G with participants during the annual health assessment. Reliability of the CIRS-G was not calculated for this study due to the nature of the scale's items, which each focus on a distinct source of pathology (e.g. cardiovascular or psychiatric). Thus, we would not necessarily expect items to be correlated. Previous research has established the test-retest reliability of the CIRS-G and its validity with a community-dwelling older adult population (Parmelee et al., 1995).

Cognitive impairment—A determination of cognitive impairment (yes or no) was made for each participant using data from two measures: the Mini-Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975) and the Clinical Dementia Rating (CDR) (Morris, 1993) scale. In this sample MMSE scores including all time points prior to placement ranged from 12 to 30 (scale range 0 - 30), and the average score was 27. Also in this sample CDR scores ranged from 0 to 2 (scale range 0 - 3), and the mode was 0. Participants with MMSE scores below 24 or CDR scores of 0.5 or above recorded on at least two separate dates were coded as being cognitively impaired. This method takes into account the fluctuations in scores that are likely in an older adult population, and is a more conservative estimate than an average score of one of the two measures (Sumic, Michael, Carlson, Howieson, & Kaye, 2007).

Analytic Approach

Average scores of longitudinal data spanning up to 5 years (see Table 1) were calculated for predictors including social activity, sleep disturbance, depressive symptoms, medical conditions, and functional impairment. We also included age at baseline and cognitive impairment in our analysis. Collinearity of each predictor was assessed with Pearson's correlations.

Logistic regression analyses were used to determine whether modifiable factors (social activity, sleep disturbance, and depressive symptoms) significantly predicted placement in a care facility over the 5-year study period. Modifiable factors were entered together in a multivariate logistic regression model, while controlling for known risk factors including cognitive impairment, functional impairment, medical conditions, and age.

Results

By the end of the 5-year study period, a total of 37 (20%) of the 189 participants transitioned to a higher level of care, including assisted living facilities ($n = 27$) or nursing homes ($n = 10$), and 45 (24%) became cognitively impaired. Demographic characteristics including gender, ethnicity, marital status, and years of education did not differ by placement group. Correlational analyses (Table 2) indicated that sleep disturbance was positively associated with depressive symptoms ($r = .35, p < .001$) and medical conditions ($r = .40, p < .001$). Medical conditions were also positively associated with depressive symptoms ($r = 0.50, p < 0.001$) and ADL impairment ($r = 0.50, p < 0.001$). Impairment of ADLs was negatively associated with social activity ($r = -.31, p < .001$) and positively associated with depressive symptoms ($r = .44, p < .001$).

Risk of Long-Term Care Placement

Findings of a multivariate logistic regression analysis (Table 3) indicated that each unit increase on a 20-point social activity scale was associated with a 24% decrease in the risk of placement in a LTC facility (OR = 0.763, $p = 0.001$, 95% CI [0.65, 0.89]) after adjusting for all other predictors in the model. Sleep disturbances and depressive symptoms were not significant individual predictors of placement in the multivariate model. Among the control variables, each additional year of age was associated with a 10% increase in risk (OR = 1.101, $p = 0.030$, 95% CI [1.01, 1.20]), persons with cognitive impairment were 3.05 times as likely to be placed in long-term care as persons without cognitive impairment (OR=3.051, $p = 0.017$, 95% CI [1.23, 7.59]), and each unit increase on a 56 point scale of the presence/severity of medical conditions was associated with a 22% increase in risk of placement (OR=1.22, $p = 0.039$, 95% CI [1.01, 1.47]). Functional impairment was not a significant individual predictor of placement in the multivariate model.

Discussion

Within a cohort of 189 older adults living independently in the community, this study examined whether modifiable factors including social activity, sleep, and depressive symptoms predicted placement in a long-term care facility. When controlling for cognitive impairment, functional impairment, medical conditions, and age, we found lower risk of

being placed in a long-term care facility for participants who engaged in more frequent social activity outside of the home. The rate of placement in this sample (20%) corresponded with rates previously reported in other samples (Banaszak-Holl et al., 2004; Luppá et al., 2010). Similar to findings in previous studies, age, cognitive impairment, and medical conditions were significant individual predictors of placement in this study. Impairment of ADLs did not increase risk of placement in this study. However, as Gaugler, Duval, Anderson & Kane (2007) demonstrated in a meta-analysis of risk factors for nursing home placement among older adults, risk increases only after a threshold of 3 or more impaired ADLs has been reached. The participants in this study had a mean of less than 1 impaired ADL, which indicates that impairment did not likely reach the level necessary to contribute to risk of placement.

Social inactivity is a modifiable factor, unlike many of the well-documented risk factors for placement in a long-term care facility (e.g. cognitive impairment, chronic medical conditions, and age). An older adult's goal to remain in the community should ideally be based upon their preferences and willingness to maintain a lifestyle compatible with independence. However, unchangeable circumstances such as advancing age and cognitive impairment interfere with this goal by increasing risk of long-term care placement for many older adults. Few studies have examined factors that can be modified by older adults who are motivated to remain in the community. The results of this study indicate that older adults who engage in more social activity outside the home may be able to delay or prevent transitions from independent living to care facilities, which has important implications for the possibility of intervention research in this area.

Social activity is a protective factor in the risk of long-term care placement. Previous research primarily focus on deficits (e.g. functional impairment and chronic medical conditions) as potential risk factors for placement of older adults (Gaugler et al., 2007; Luppá et al., 2010). A deficit model reinforces the notion that long-term care placement is by default the result of losses incurred during aging. Other researchers (James et al., 2011; Wang et al., 2013) have discovered the protective effect of social activity on cognitive and functional decline of older adults. In this study social activity protected participants against risk of long-term care placement. These results contribute to a growing body of evidence that a lifestyle factor—social activity—may protect older adults from a number of negative outcomes. In addition, the results indicate that late-life transitions to long-term care facilities may be due in part to personal choices such as ending memberships in clubs, or deciding to save money by less frequent traveling or eating out in restaurants on fewer occasions. The implication is that these seemingly small decisions can compile and lead to social inactivity, which in turn increases risk of long-term care placement. For example, participants who dined out just one time more per month may have decreased their risk of placement by 24%. Although we did not have sufficient statistical power to analyze the data for individual social activities most associated with reducing the risk of placement, scoring high on the item “eating out” appeared to be the most influential in those participants that avoided placement (data not shown). Future studies will more specifically examine the particular social activities that are of benefit in reducing placement risk.

Limitations surrounding the measurement of individual predictors may have affected the results of this study. Summary scores on measures were averaged across time for each participant to create a single value for predicting placement. Measures that were completed at more frequent intervals or at different times within the study period may have contributed disparately to the accuracy of average score. Other limitations of this study include self-reporting of social activity and sleep disturbances, which, due to the extended period for participant recall (one year and 6-months, respectively), may have led to recall bias. Future studies could improve accuracy with objective measures or shorter intervals between measurements.

Alternative explanations may also account for these results. Although we controlled for cognitive impairment, functional impairment, age, medical conditions, sleep disturbances, and depressive symptoms, we cannot rule out the possibility that other unmeasured “third variables” are correlated with social activity and are the real causes of this protective effect. One theory is that older adults selectively sustain the activities that have the greatest relevance or perceived benefit to their lives (Baltes & Baltes, 1990). It is possible that there is another factor related to risk of placement that older adults who sustain social activities have in common. Future studies should address this possibility by identifying the causal mechanisms underlying the protective effect of social activity. The interaction between social activity, cognitive impairment, and functional impairment (as mediators or moderators of the relationship with placement) will be another important next step, especially given previous findings that social activity decreases risk of cognitive and functional impairment (James et al., 2011; Wang et al., 2013). Finally, an investigation of other potential confounding variables should be incorporated in future studies on social activity as a protective factor. The intersection between personality and social activity preferences, aspects of culture, and other contextual factors such as geography are a few examples that warrant further investigation. Integrating a variety of aspects of lifestyle, aging, and health into research on long-term care placement risk will help move the science toward preventing early or unnecessary long-term care placement.

Conclusion

Promoting social activity may be an effective way to protect older adults against the risk of transitions to long-term care facilities. Future research should focus on a more detailed and specific understanding of the types of social activities that contribute to protection against placement. With this deeper understanding we will be better positioned to design and test interventions to help older adults maintain a lifestyle compatible with independence.

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Table 1

Enrollment and Assessment Timeline

| Event | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|-----------------------------------|------|------|------|------|------|------|
| Enrollment, n= | 171 | 10 | 8 | | | |
| Placement, n= | | 2 | 6 | 11 | 14 | 4 |
| Other attrition ¹ , n= | 1 | 9 | 8 | 16 | 51 | 13 |
| Assessment | | | | | | |
| Social Activity | + | + | + | + | + | + |
| Sleep Disturbance ² | + | ◆ | ◆ | + | | |
| Depressive Symptoms | + | ◆ | ◆ | ◆ | ◆ | + |
| ADL Impairment | + | + | + | + | + | + |
| Medical Conditions | + | + | + | + | + | + |
| Mini-Mental State Examination | + | + | + | + | + | + |
| Clinical Dementia Rating Scale | + | + | + | + | + | + |

Notes. ADL= Activity of Daily Living; += measure assessed at annual intervals; ◆= measure assessed at 6-monthly intervals

¹ Attrition due to deaths, dropouts, and un-enrollment by the research team. All un-enrollment occurred in 2011 in order to focus the ISAAC study on only those participants living alone.

² Assessment occurred partially online (baseline measure completed on paper).

Table 2

Pearson's Correlations between Predictors

| Predictors | 1 | 2 | 3 | 4 | 5 | 6 |
|-------------------------|-------------|------------|------------|------------|-----|-----|
| 1. Social Activity | – | | | | | |
| 2. Sleep Disturbance | .02 | – | | | | |
| 3. Depressive Symptoms | –.25 | .35 | – | | | |
| 4. ADL impairment | –.31 | .21 | .44 | – | | |
| 5. Medical Conditions | –.13 | .40 | .50 | .50 | – | |
| 6. Cognitive Impairment | –.29 | –.02 | .22 | .26 | .04 | – |
| 7. Age | –.18 | .05 | .08 | .23 | .18 | .09 |

Notes. Correlations in bold are significant at the level of $p < .001$. ADL= activity of daily living

Table 3

Predictors of Placement: Multivariate Logistic Regression Results, Adjusted for All Other Predictors

| Predictor (Scale Range): Sample Mean ±SD | Odds Ratio, p-value, 95% Confidence Interval |
|---|---|
| Social Activity (0 – 20): 9.20 ±2.90 | OR=0.763, p=.001, CI [0.65, 0.89] |
| Sleep Disturbance (0 – 20): 3.74 ±2.93 | OR=1.024, p=.762, CI [0.88, 1.19] |
| Depressive Symptoms (0 – 15): 1.20 ±1.33 | OR=0.829, p=.356, CI [0.58, 1.19] |
| Cognitive Impairment, yes: n=45, no: n=144 | OR=3.051, p=.017, CI [1.23, 7.59] |
| Age at baseline (66 – 95): 83.56 ±5.48 | OR=1.101, p=.030, CI [1.01, 1.20] |
| Medical Conditions (0 – 56): 21.41 ±2.66 | OR=1.220, p=.039, CI [1.01, 1.47] |
| ADL Impairment (0 – 18): 0.64 ±0.94 | OR=0.935, p=.777, CI [0.59, 1.49] |

Notes. Predictors in bold are significant at the alpha level of .05. OR = odds ratio; CI= 95% confidence interval; McFadden's R^2 = .20, Likelihood ratio χ^2 (37.23, $p < .0001$). Post-estimation procedures indicated that the overall fit of the multivariate model was good: the Hosmer-Lemeshow goodness-of-fit test was non-significant ($p = .37$), the correct classification rate was 81%, and the area under the curve was 80%.