Published in final edited form as:

Res Gerontol Nurs. 2020 January 01; 13(1): 31–40. doi:10.3928/19404921-20190930-02.

Gender Differences in Function, Physical Activity, Falls Medication Use and Life Satisfaction Among Assisted Living Residents

Barbara Resnick, PhD, CRNP [Professor],

University of Maryland School of Nursing, 655 West Lombard St, Baltimore MD 21218, Tel: 410 706 5178;

Marie Boltz, PhD, CRNP [Professor],

Pennsylvania State University, College of Nursing, 306 Nursing Sciences Building, University Park, PA 16802

Elizabeth Galik, PhD [Professor],

University of Maryland School of Nursing, 655 West Lombard St, Baltimore MD 21218

Sarah Holmes, MSW [Doctoral Student],

University of Maryland School of Nursing, 655 West Lombard St, Baltimore MD 21218

Steven Fix, BS [Project Manager],

University of Maryland School of Nursing, 655 West Lombard St, Baltimore MD 21218

Shijun Zhu, PhD [Associate Professor]

University of Maryland School of Nursing, 655 West Lombard St, Baltimore MD 21218

Abstract

The purpose of this study was to test for gender differences among assisted living residents. This was a secondary data analysis using data from the first 64 facilities participating in the ongoing Function Focused Care for Assisted Living study using the Evidence Integration Triangle (FFC-AL-EIT). A total of 593 residents were recruited from 64 assisted living settings. Differences by gender with regard to function, physical activity, falls, total numbers of medications, and satisfaction with assisted living were tested using multivariate analysis of variance. There were 166 males (28%) and 427 females (72%) with a mean age of 88 (SD=7.5). The participants had 5 comorbidities (SD= 2) and took on average 6.88 medications (SD=3.47). Participants had moderate functional impairment with a mean of 64.13 (SD=19.09) on the Barthel Index and engaged in 43.80 (SD=76.12) minutes daily of moderate level physical activity. Females reported higher satisfaction with activities [4.32 (SD=1.14) for females and 3.85 (SD=1.51) for males] and females received more medications than males [7.09 (SD=3.51) for females and 6.34 (SD=3.31) for males]. Current study findings suggest that deprescribing may be particularly important for females versus males and focusing on expanding activity options to include those preferred by males should be considered in AL settings.

Keywords

Gender; medications; physical activity; falls; satisfaction

Gender is defined as “environmental, social, and cultural influences on the biological factors in women and men (Isaksson, Graneheim, Åström, & Karlsson, 2011).” The impact of gender has not been extensively studied among older adults with regard to clinical outcomes such as function, physical activity, falls, medication use and satisfaction with life or living situation. Moreover, the research that has been done was mostly based on community dwelling older adults.

Gender Differences in Function and Physical Activity

It has repeatedly been noted that community dwelling older males tend to have better function and engage in more physical activity than their female counterparts (Ahmed et al., 2018; Ahmed, Vafaei, Auals, Guralnik, & Zunzunegui, 2016; Finkel, Andel, & Pedersen, 2018; Shaw, Liang, Krause, Gallant, & McGeever, 2010; Small, Dixon, McArdle, & Grimm, 2012). Females tend to decline more in physical activity with age than males (Bruun, Maribo, Nørgaard, Schiøttz-Christensen, & Mogensen, 2017; Finkel et al., 2018; Oshio & Oshio, 2012) and are less likely to reach recommended levels of physical activity (Lin, Yeh, Chen, & Huang, 2010). Females also tend to participate more in social (e.g., church) rather than physical activities (Finkel et al., 2018; Oshio & Oshio, 2012; Zhang, Feng, Lacanienta, & Zhen, 2017).

The research done exploring gender differences in physical activity among individuals living in facilities has been inconsistent and sample or study specific. In one recent study in a geriatric rehabilitation facility it was noted that males reported greater life space and thus engaged in more physical activity than females (Ullrich et al., 2019). Conversely, several studies of assisted living residents reported that males spent more time in sedentary activity than females (Bellettiere et al., 2015; Leung et al., 2017). Similarly, there were differences in the association between gender and falls among older adults. Some reports suggested that females were more likely to fall (Pauelsen, Nyberg, Roijezon, & Vikman, 2018; Sotoudeh, Mohammadi, Mosallanezhad, Viitasara, & Soares, 2018), some noted that males were more likely to fall (Cameron, Bowles, Marshall, & Andrew, 2018; Vieira de Sousa et al., 2016), while others noted no association between gender and falls (Bor et al., 2017).

Gender Differences in Satisfaction with Living Situation and Overall Life Satisfaction

Satisfaction with living in a nursing home has been associated with gender such that males were less likely to experience adjustment problems than females and tended to report less dissatisfaction with the facility (Claridge, Rowell, Duffy, & Duffy, 1995; Greenwood, 1999). Similarly, life satisfaction, including physical, psychological, social, and environmental domains, was rated higher by older male versus older female nursing home residents (Barca, Engedal, Laks, & Selbaek, 2011; Onunkwor et al., 2016; Vitorino, Paskulin, & Vianna,

2012). The same findings were noted among males and females living in the community (Read, Grundy, & Foverskov, 2016). Differences in life satisfaction between males and females may vary based on the country in which the individual lives and the setting of care. Countries in which there is greater gender inequality tend to note gender differences in life satisfaction between males and females, with men expressing more satisfaction (Read et al., 2016; Sole-Auro, Jasilionis, Li, & Oksuzyan, 2018; Zhang et al., 2017).

Medication Use and Gender Differences

Polypharmacy is an important area to consider given the impact of multiple medications on the risk of falls, delirium, and other geriatric syndromes. Although polypharmacy is common among all older adults, females tend to experience more polypharmacy (Midao, Giardini, Menditto, Kardas, & Costa, 2018; Rozenfeld, Fonseca, & Acurcio, 2008) and greater exposure to potentially inappropriate medications compared to males (Herr et al., 2017). Most studies of older adults in the community or in nursing homes note that females receive more pain medication than males including opioids (Hunnicut et al., 2018; Sandvik, Selbaek, Kirkevold, SHusebo, & Aarsland, 2016). Females are also more likely to be prescribed anxiolytics, antipsychotics, and antidepressants (Dore, Piras, Loretto, & Pes, 2016; Fog, Straand, Engedal, & LBlix, 2019; Kettunen et al., 2019).

Currently over 31,000 assisted living (AL) settings nationwide serve almost 750,000 older adults (Congressional Budget Office, 2013). Nearly 40% of residents in ALs require assistance with three or more activities of daily living (ADLs) and the majority need help with meal preparation and medication management (American Association of Homes and Services for the Aging, 2009). They have multiple chronic conditions and an average length of stay of two years (American Association of Homes and Services for the Aging, 2009). Residents in ALs are sedentary and experience functional decline beyond what is expected from disease progression (Resnick et al., 2018; Zimmerman, 2013). Limited physical activity increases residents' risk for falls, pain, pressure ulcers and hospitalizations (Chung, 2013; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2011b) and decreases quality of life (Kim & Park, 2014; Lapane, 2012). Given the increase in individuals living in assisted living settings and the potential gender differences in clinical outcomes with regard to function, physical activity, medication use, falls and life satisfaction or satisfaction with their living situation in these settings, the purpose of this study was to explore gender differences across multiple outcomes among assisted living residents. Specifically we hypothesized that there would be significant differences between male and female residents with regard to function, physical activity, falls, number of medications given as well as differences in use of specific psychotropic and pain medications, and satisfaction with assisted living. Knowing if there are differences in these outcomes in assisted living residents based on gender will provide an important first step to developing gender specific interventions to address these outcomes.

Methods

Design and Sample

This study was a secondary data analysis using data from the first 64 facilities participating in an ongoing randomized trial testing the dissemination and implementation of Function

Focused Care for Assisted Living study using the Evidence Integration Triangle (FFC-AL-EIT). The study was approved by a University based Institutional Review Board. AL settings were invited to participate if they: (1) had at least 25 beds; (2) identified a staff member (i.e., registered nurse, licensed practice nurse, direct care worker, social worker) to work with the study team in the implementation of the FFC-AL-EIT intervention; and (3) were able to access email and websites via a phone, tablet, or computer. Sites were randomized to treatment or Education Only (EO). AL residents were eligible to participate if they were 65 years of age or older, able to speak English, living in a participating assisted living facility at the time of recruitment, and able to recall at least one out of three words as per the Mini-Cog (Borson, Scanlan, Chen, & et al, 2003). Residents were excluded if they were enrolled in hospice. A five-item Evaluation to Sign Consent (Resnick et al., 2007) questionnaire was used to determine the residents' capacity to provide consent to participate in the study. If the resident did not pass the Evaluation to Sign Consent, he or she was asked to assent to the study and consent was obtained from the resident's legally authorized representative. A total of 593 residents were recruited into the study from 64 assisted living settings across Maryland, Pennsylvania, and Massachusetts.

Measures

Measures for the parent study were collected at baseline, 4, and 12 months post implementation of the intervention, although only baseline data were used in this analysis. Data were collected by research assistants all of whom had prior experience working with this population. The following resident descriptive information was obtained: age, gender, number of comorbidities based on chart data, falls in the four month period prior to implementation of the study provided by facility staff, medications based on chart data (including the following: medications for depression, anxiety, gastrointestinal problems, seizure, pain including opioids, anemia, hyperlipidemia, diabetes, osteoporosis, anticoagulation, sedative hypnotics, Parkinson's disease, prostate disease, steroids, antipsychotics, allergies, and chemotherapeutic agents), and cognitive status which was based on the Mini-Cog screening tool (Borson et al., 2003), specifically the individual's ability to recall 0, 1, 2, or 3 out of 3 words. The Mini-Cog was developed as a brief screening tool to identify those with likely dementia. The Mini-Cog has sensitivity ranging from 76–99%, and specificity ranging from 89–93% with a 95% confidence interval (Borson et al., 2003). The Barthel Index (Mahoney & Barthel, 1965) was used to evaluate function. The Barthel Index includes 10-items that address activities of daily living (e.g., bathing, dressing). Items are weighted to account for the amount of assistance required. A score of 100 indicates complete independence. Estimates of internal consistency ranged from alpha coefficients of 0.62 to 0.80, inter-rater reliability was supported based on an intra-class correlation of 0.89 between two observers; and validity was based on correlations with the Functional Inventory Measure ($r=0.97$, $p<.05$)(Mahoney & Barthel, 1965). Data was obtained via verbal report of function from the direct care worker providing care for the resident on the day of testing.

Residents' satisfaction with the assisted living setting was assessed using four subscales from the Resident Satisfaction Index (RSI) (Sikorska-Simmons, 2001). The four subscales from the RSI focused on: (1) the residents' perceptions of health care (4 items: e.g., are you

satisfied with the skills of the staff you interact with); (2) the physical environment (4 items: e.g., do you lack personal space); (3) relationships with staff (8 items: e.g., are the staff kind and caring); and (4) physical and social activities (5 items: e.g., do you like the physical and social activities here). Participants were asked to agree (1) or disagree (0) with each item and scores were totaled such that higher scores were indicative of higher resident life satisfaction. Prior research has supported internal consistency and validity based on factor analysis and significant correlations with psychological well-being (Sikorska-Simmons, 2001).

Physical activity was based on accelerometry data collected with the Motionwatch 8 (CamNtech, 2018) and specifically time spent in moderate level physical activity. The MotionWatch 8 is a compact, lightweight, wrist-worn activity monitoring device used to document physical movement. The Motionwatch 8 contains a miniature accelerometer to allow measurement and recording of physical movement of the wrist, which provides a close correlation to whole body movement. Reliability, validity, and cut points for different levels of activity based on counts of activity have been established for older adults (Landry, Falck, Beets, & Liu-Ambrose, 2015). The cut points established for moderate level physical activity were > 562 counts per minute (Landry et al., 2015). Counts are the unit of measurement used to evaluate activity when calculated by any type of actigraph. The device counts the number of times the waveform crosses 0 for each time period being evaluated. Moderate level physical activity was used as this is the basis of recommended guidelines for older adults (i.e., 30 minutes daily of moderate level physical activity) and thus allows for comparisons across multiple samples. The Motionwatch 8 was placed on participants for 5 days with data evaluated for the three full days between placement and removal (i.e., days 2, 3, and 4). There was no significant difference in activity on days 2, 3, and 4 and so day 2 data was used for all analyses.

Data Analysis

Descriptive analyses were done to describe the sample including a t-test to describe differences in age and comorbidities between males and females. Differences by gender with regard to function, physical activity, falls, total numbers of medications, and satisfaction with assisted living as per our hypothesis were tested using multivariate analysis of variance. Multivariate analysis of variance was used to test the effect of the independent variable (gender) on a set of two or more dependent variables. Absence of multivariate outliers was checked by assessing Mahalanobis Distances among the participants. The critical value for the Mahalanobis Distance was 24.01 and there was no evidence of outliers. All variables met the assumption of linearity and there was no evidence of multicollinearity. The Box's M test was used to evaluate if covariance matrices were equal. The Box's M was significant (Box's M = 52.85, $F=1.43$, $p=.05$) so the Pillai-Bartlett trace was used to determine multivariate significance (Cohen, 2008). There was no association between age and comorbidities with function, physical activity, falls, medication use or satisfaction with assisted living so these factors were not controlled for in the analysis.

To test for differences in specific drug group use (being on at least one drug within each group, e.g., one antidepressant, one pain medication) between males and females chi-square analyses were performed. A $p = .05$ level of significance was used for all analyses.

Results

There were 166 males (28%) and 427 females (72%) in the study with an overall mean age of 88 ($SD=7.19$). The participants had approximately 5 comorbidities ($SD=2$) and took on average 6.88 medications ($SD=3.47$). Overall the Resident Life Satisfaction subscales scores were high with the mean Health Care Satisfaction being 3.59 ($SD=.81$) out of a total score of 4, mean Physical Environment Satisfaction at 4.35 ($SD=.93$) out of a total possible score of 5, mean Relationships with Staff equal to 7.09 ($SD=1.27$) out of a total possible score of 8, and mean Satisfaction with Activities being 4.19 ($SD=1.28$) out of a possible score of 5. There was evidence of moderate functional impairment with a mean of 64.13 ($SD=19.09$) on the Barthel Index out of a total score of 100 indicating independence. The participants engaged in 43.80 ($SD=76.12$) minutes daily of moderate level physical activity based on the Motionwatch 8 recordings. Twenty-five percent of the participants experienced at least one fall over the four months prior to the start of the study.

Multivariate test results are shown in Table 1. The Pillai's Trace was significant for gender with an $F=2.10$ ($p=.02$). Females reported higher satisfaction with activities provided in the setting [4.32 ($SD=1.14$) for females and 3.85 ($SD=1.51$) for males, $F=10.28$, $p=.01$] and females received slightly more medications than males [7.09 ($SD=3.51$) for females and 6.34 ($SD=3.31$) for males, $F=2.09$, $p=.05$]. There were no differences with regard to falls, function, physical activity, or satisfaction with the physical environment, relationships with staff, or health care.

Table 2 provides the frequency of medication use by gender. Across both groups the most commonly prescribed medications included medications for osteoporosis, hyperlipidemia, gastrointestinal problems, anticoagulants, and antidepressants. The rate of use of opioids was low at 4 – 8%, as was the rate of sedative hypnotics at 2 – 4%, anxiolytics at 3 – 9% and antipsychotics at 9 – 13%. Females were significantly more likely than males to get steroids (36% of females versus 24% of males, $\chi^2=7.22$, $p=.007$), medications for osteoporosis (50% of females versus 34% of males, $\chi^2=12.22$, $p=.001$), medications for cardiovascular disease (39% of females versus 29% of males, $\chi^2=5.61$, $p=.018$), pain medications including opioids (30% of females versus 18% of males, $\chi^2=8.67$, $p=.003$), anxiolytics (9% of females versus 3% of males, $\chi^2=6.16$, $p=.013$), and antidepressants (45% of females versus 32% of males, $\chi^2=8.09$, $p=.004$).

Discussion

The findings from this study provided partial support for the hypothesis that there would be a significant difference between males and females in assisted living settings with regard to function, physical activity, falls, medication use and satisfaction with assisted living. In this sample the only differences noted by gender were related to number of and types of some medications given and satisfaction with activities. Females were noted to be more satisfied

with activities and to take significantly more medications than males. Higher satisfaction with activities within assisted living settings by females versus males is not surprising given that older females generally tend to enjoy and engage in more social activity than older males (Finkel et al., 2018; Oshio & Oshio, 2012; Zhang et al., 2017). Conversely, older males are more likely to engage in less social activities such as reading and exercise (Zhang et al., 2017). There were no differences noted by gender with regard to satisfaction with the care provided, relationships with staff, or the environment. Overall satisfaction with assisted living was actually quite high across all these areas which is consistent with a national survey of resident satisfaction completed by the Assisted Living Federation of America (Assisted Living Federation of America, 2016; Hoban, 2010). Future research should continue to explore the factors that influence resident satisfaction with activities and how these are different between genders. These findings will help guide the types of activities males versus females prefer and expand on types of activities needed to improve participation and satisfaction across both genders.

Our findings related to medication use were similar to other studies noting that females used more medications than males (Midao et al., 2018; Morgan et al., 2016; Niclós, Olivar, & Rodilla, 2018; Rozenfeld et al., 2008). The rates of use across both males and females were consistent with polypharmacy, defined as taking five or more medicines (Viktil, Moger, & Reikvam, 2007), and raises concerns about the risk of potentially inappropriate medications (Herr et al., 2017; The 2019 American Geriatrics Society Beers Criteria® Update Expert Panel, 2019). For example, the high use of medications for osteoporosis and hyperlipidemia could be questioned given the average age of the participants and the questionable value of these medications at this point in their lives. Likewise, the high rate of anticoagulant use, with aspirin being the most common treatment, needs to be reconsidered given the current guidelines recommending against aspirin use for those greater than 70 years of age without a significant history of cardiovascular disease (United States Preventive Services Taskforce, 2018).

Females, as has been previously noted, were more likely to be treated for pain (Hunnicut et al., 2018; Sandvik et al., 2016) using a variety of pain medications. The actual rate of opioid use was lower among this sample than has been seen in some nursing home samples (Fog et al., 2019; Griffioen, Husebo, Flo, Caljouw, & Achterberg, 2017; Sandvik et al., 2016) although the rates were similar to a recent report of nursing homes from Maryland and Pennsylvania (Resnick et al., in press). It is possible that the low rate of opioid use is due to a current focus on decreasing opioids nationally (Dowell, Haegerich, & Chou, 2016). Future research needs to continue to explore gender differences and the use of and need for opioids versus other treatment modalities for pain among assisted living residents.

The rate of antipsychotic medication use (9 – 13%) in this sample of assisted living residents was lower than the national current rate of 15.7% of residents in nursing homes in the United States (Centers for Medicare and Medicaid, 2018). The sample rates were, however, higher than the rate of 9% reported from nursing home residents in the United Kingdom (Ballard, Corbett, Orrell, & et al, 2018). Although there was not a significant difference between genders with regard to antipsychotic use, consistent with prior research (Kamble,

Chen, Sherer, & Aparasu, 2008), males tended to be more likely to receive antipsychotics than females.

The rate of antidepressant use was similar to that found in other studies both among community dwelling and nursing home residents (Fog et al., 2019; Helvik, Saltyt Benth, Wu, Engedal, & Selbæk, 2017; Koller, Hua, & Bynum, 2016; MacLagan et al., 2017; Maust, Langa, Blow, & Kales, 2017). As noted previously there was no difference in treatment between males and females (Blumstein, Benyamini, Shmotkin, & Lerner-Geva, 2014; Jacob & Kostev, 2016). Generally the rate of use of sedative hypnotics and anxiolytics was lower in our assisted living sample than other studies that included community dwelling and nursing home residents (Fog et al., 2019; Resnick et al., in press). As has been previously noted, however, women were more likely to be receiving anxiolytics. Further a study of Israeli older adults noted differences in the factors that influence use of anxiolytics between males and females such that age, not being married, sleeping problems and depressive symptoms were significant correlates of use of anxiolytics among males while any life trauma and being married correlated with use of anxiolytics among females (Blumstein et al., 2014). Continued research is needed to test the associated of these factors with use of anxiolytics and then develop interventions to help address these factors and decrease medication use. For example, married women may be using anxiolytics due to the stress of caregiving for a spouse. Help with caregiving may be able to offset that stress.

In contrast to prior research noting that males tended to be more physically active and functionally intact than females (Ahmed et al., 2018; Ahmed et al., 2016; Finkel et al., 2018; Ullrich et al., 2019; Zhang et al., 2017) we noted no gender differences in this study. It is possible that there is more homogeneity of physical activity and function among those who live in assisted living versus those in the community (Phillips et al., 2018; Resnick, Galik, Gruber-Baldini, & Zimmerman, 2011a).

Although there was no difference in the amount of activity performed between males and females, it has been suggested that there are differences in barriers and facilitators to physical activity between males and females. Several qualitative reports (Kwon et al., 2016; Sandlund et al., 2018) noted that there are differences in barriers to walking for females versus males. Specifically, females describe neighborhood safety concerns, chronic medical conditions and pain as barriers to physical activity while males note that barriers include laziness or low self-efficacy associated with walking. Facilitators for walking among females were fear of nursing home placement and fear of falling and a desire for weight maintenance or loss. Conversely males were more interested in exercise as a way to maintain function and keep fit. Future research in assisted living should continue to explore for differences in function and physical activity between genders and identify the factors that serve as facilitators and barriers to function and physical activity across genders.

As has been shown in other studies of assisted living residents (Hummer, Silva, Yap, Toles, & Anderson, 2015; Naylor et al., 2016; Resnick et al., 2011a), the participants in this study needed some help with activities of daily living based on the Barthel Index. Despite needing help with activities of daily living, the study participants engaged in more than the recommended amount of moderate level physical activity and more activity than previously

reported among older adults in assisted living (Corcoran et al., 2016; Leung et al., 2017; Resnick et al., 2011a). Current study participants were noted to engage in a mean of 43.80 (SD=76.12) minutes of moderate level physical activity daily while participants in another study of physical activity among assisted living residents were noted to spend only one minute in moderate to vigorous physical activity (Leung et al., 2017). We anticipate that these differences are based on measurement issues including the type of device used and the setting of counts per level of activity. The Motionwatch 8 was set based on prior research with older adults so that moderate level physical activity was greater than or equal to 562.50 counts per minute. This is in contrast to the Actigraph, which was used in the Leung et al., study, with settings based on the Freedson equation (Freedson, Melanson, & Sirard, 1998). The Freedson calculation defines moderate level activity as 1,964 counts per minute and may underestimate the amount of energy expended by older individuals (Pruitt et al., 2008).

There was no difference in the frequency of falls between males and females in our sample. Some prior research has likewise reported no difference between the two groups with regard to falls or fall risks (Alves Guimarães et al., 2018; Cameron et al., 2018; Lastrucci, Lorini, Rinaldi, & Bonaccorsi, 2018). Falls are due to multiple factors and gender may be less important than physical activity, balance, cognition, or the environment

Study Limitations

This study was limited in that it was a secondary data analysis and not designed to test for gender differences among participants. The study included residents from 64 facilities from three states and there may have been some bias in the sample as these were all individuals who consented to participate in the parent FFC-AL-EIT study. Further the function data may have been biased as it was based on recall of the staff that worked with the resident on the day of testing. It is possible that the staff reported on the care they provided to the resident versus truly measuring what the resident was able to perform him or herself. The completion of the Resident Life Satisfaction survey may have been biased due to social desirability and fear on the part of the resident to say anything negative about the facility. Despite these limitations, the findings of this study provide some indication that there may be differences among males and females with regard to medication use and satisfaction with activities. Continued evaluation of gender differences in these settings should be done to help guide how care is provided. Current study findings suggest that deprescribing may be particularly important for females versus males and focusing on expanding activity options to include those preferred by males should be considered in AL settings.

References

- Ahmed T, Vafaei A, Auais M, Phillips SP, Guralnik J, & Zunzunegui M (2018). Health behaviors and chronic conditions mediate the protective effects of masculinity for physical performance in older adults. *Journal of Aging and Health*, 30(7), 1062–1083. [PubMed: 28553820]
- Ahmed T, Vafaei A, Auais M, Guralnik J, & Zunzunegui M (2016). Gender roles and physical function in older adults: Cross-sectional analysis of the International Mobility in Aging Study (IMIAS). *PLOS One*, 6 3, 2016, 1–18.
- Alves Guimarães É, Rodrigues Lima K, Fernandes Oliveira F, Mota da Silva R, Resende Sousa L, Duarte Lima Makhoul K, & de Matos Boaventura C (2018). Comparison of propensity to falls in

male and female elderly and its correlation between the balance and cognition level. *Manual Therapy, Posturology & Rehabilitation Journal*, 16, 1–6.

American Association of Homes and Services for the Aging, A.S.H.A., Assisted Living Federation of American, National Center for Assisted Living, and National Investment Center for the Seniors Housing & Care Industry. (2009). Overview of Assisted Living. Available at: <http://www.alfa.org/Mall/StoreHome.asp?MODE=VIEW&STID=1&LID=1&PRODID=16>. Last accessed June, 2019.

Assisted Living Federation of America. (2016). Resident Satisfaction Survey. Available at: <https://www.assistedliving.com/majority-assisted-living-residents-satisfied-says-survey/>. last accessed June, 2019.

Ballard C, Corbett A, Orrell M, & et al. (2018). Impact of person centred care training on a person centred activities on quality of life, agitation, and antipsychotic use in people with dementia living in nursing homes: A cluster-randomised controlled trial. *PLOS Medicine*, 1–18.

Barca M, Engedal K, Laks J, & Selbaek G (2011). Quality of life among elderly patients with dementia in institutions. *Dementia & Geriatric Cognitive Disorders*, 31 (6), 435–442. [PubMed: 21757909]

Bellettiere J, Carlson D, Rosenberg J, Singhanian A, Natarajan A, Berardi V, ... Kerr J (2015). Gender and age differences in hourly and daily patterns of sedentary time in older adults living in retirement communities. *PLOS One*, 10(8). Available at: <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0136161>. Last accessed June, 2019.

Blumstein T, Benyamini Y, Shmotkin D, & Lerner-Geva L (2014). Gender differences in the prevalence and correlates of psychotropic medication use among older adults in Israel. *Israeli Journal of Psychiatry & Related Sciences*, 51(2), 118–125.

Bor A, Matuz M, Csator dai M, Szalai G, Bálint A, Benk R, ... Doró P (2017). Medication use and risk of falls among nursing home residents: A retrospective cohort study. *International Journal of Clinical Pharmacy*, 39(2), 408–415. [PubMed: 28188510]

Borson S, Scanlan J, Chen P, & et al. (2003). The Mini-Cog as a screen for dementia: Validation in a population-based sample. *Journal of the American Geriatrics Society*, 51, 1451–1454. [PubMed: 14511167]

Bruun I, Maribo T, Nørgaard B, Schiøttz-Christensen B, & Mogensen C (2017). A prediction model to identify hospitalised, older adults with reduced physical performance. *BMC Geriatrics*, 17, 1–10. [PubMed: 28049446]

Cameron E, Bowles S, Marshall E, & Andrew M (2018). Falls and long-term care: a report from the care by design observational cohort study. *BMC Family Practice*, 19(1), 1–10. [PubMed: 29291706]

CamNtech. (2018). The Motionwatch 8. Available at: https://www.camntech.com/products/motionwatch/motionwatch-8-overview?gclid=EA1aIQobChMImceDyune3gIVCySGCh36BQSGEAAAYASAAEgKktfD_BwE. Last accessed June, 2019.

Centers for Medicare and Medicaid. (2018). Data show National Partnership to Improve Dementia Care achieves goals to reduce unnecessary antipsychotic medications in nursing homes. Available at: <https://www.cms.gov/newsroom/fact-sheets/data-show-national-partnership-improve-dementia-care-achieves-goals-reduce-unnecessary-antipsychotic>. Last accessed June, 2019.

Chung G (2013). Understanding nursing home worker conceptualizations about good care. *The Gerontologist*, 53(2), 246–254. [PubMed: 22936538]

Claridge K, Rowell R, Duffy J, & Duffy M (1995). Gender differences in adjustment to nursing home care. *Journal of Gerontological Social Work*, 24, 155–168.

Cohen B (2008). *Explaining Psychological Statistics*. New York, NY John Wiley & Sons.

Congressional Budget Office. (2013). Rising Demand for Long-Term Services and Supports for Elderly People. Available at: www.cbo.gov. Last accessed June, 2019.

Corcoran M, Chui K, White D, Reid K, Kim D, Nelson M, ... Fielding R (2016). Accelerometer assessment of physical activity and its association with physical function in older adults residing at assisted care facilities. *Journal of Nutrition, Health & Aging*, 20(7), 752–758.

Dore M, Piras L, Loretto L, & Pes G (2016). Pattern of psychotropic medications use in a cohort of patients with uninvestigated dyspepsia undergoing upper endoscopy. *Medicine*, 95, 1–6.

- Dowell D, Haegerich T, & Chou R (2016). CDC guideline for prescribing opioids for chronic pain—United States, 2016. *JAMA*, 315, 1624–1645. [PubMed: 26977696]
- Finkel D, Andel R, & Pedersen N (2018). Gender differences in longitudinal trajectories of change in physical social and cognitive/sedentary leisure activities. *Journals of Gerontology B: Psychological Sciences and Social Sciences*, 73(8), 1491–1500. [PubMed: 27624718]
- Fog A, Straand J, Engedal K, & LBlix H (2019). Drug use differs by care level. A cross sectional comparison between older people living at home or in a nursing home in Oslo, Norway. *BMC Geriatrics*, 19, 1–9. [PubMed: 30606112]
- Freedson PS, Melanson E, & Sirard J (1998). Calibration of the Computer Science and Applications, Inc. accelerometer. *Medicine and Science in Sports and Exercise*, 30(5), 777–781. [PubMed: 9588623]
- Greenwood N (1999). Androgyny and adjustment in later life: Living in a veterans' home. *Journal of Clinical Geropsychology*, 5, 127–137.
- Griffioen C, Husebo B, Flo E, Caljouw M, & Achterberg W (2017). Opioid prescription use in nursing home residents with advanced dementia. *Pain Medicine* Available at: <https://www.ncbi.nlm.nih.gov/pubmed/29136228>. Last accessed June, 2019.
- Helvik A, Saltyt Benth J, Wu B, Engedal K, & Selbæk G (2017). Persistent use of psychotropic drugs in nursing home residents in Norway. *BMC Geriatrics*, 17 Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5307887/pdf/12877_2017_Article_440.pdf. Last accessed June, 2019.
- Herr M, Grondin H, Sanchez S, Armaingaud D, Blochet C, Vial A, ... Ankri J (2017). Polypharmacy and potentially inappropriate medications: A cross-sectional analysis among 451 nursing homes in France. *European Journal of Clinical Pharmacology*, 73, 601–608.
- Hoban S (2010). Improving resident satisfaction. *Long-Term Living: For the Continuing Care Professional*, 59(3), 20–24.
- Hummer D, Silva S, Yap T, Toles M, & Anderson R (2015). Implementation of an exercise program in an assisted living facility. *Journal of Nursing Care Quality*, 30(4), 373–379. [PubMed: 26035553]
- Hunnicut J, Chrysanthopoulou S, Ulbricht C, Hume A, Tijia J, & Lapane K (2018). Prevalence of long term opioid use in long stay nursing home residents. *Journal of the American Geriatrics Society*, 66(1), 48–55. [PubMed: 28940193]
- Isaksson U, Graneheim U, Åstrom S, & Karlsson S (2011). Physically violent behaviour in dementia care: Characteristics of residents and management of violent situations. *Aging & Mental Health*, 15(5), 573–579. [PubMed: 21815849]
- Jacob L, & Kostev K (2016). Gender-based differences in the antidepressant treatment of patients with depression in German psychiatric practices. *German Medical Science*, 14, 2.
- Kamble P, Chen H, Sherer J, & Aparasu R (2008). Antipsychotic drug use among elderly nursing residents in the United States. *American Journal of Geriatric Pharmacology*, 6(4), 187–197.
- Kettunen R, Taipale H, Tolppanen A, Tanskanen A, Tilhonen J, Hartikainen S, & Koponen M (2019). Duration of new antidepressant use and factors associated with discontinuation among community-dwelling persons with Alzheimer's disease. *European Journal of Clinical Pharmacology*, 75(3), 417–425.
- Kim S, & Park E, Kim S, Nakagawa S, Lung J, Choi JB, Ryu Woo, S, Min TJ, Shin HP, Kim K, et al. (2014). The association between quality of care and quality of life in long-stay nursing home residents with preserved cognition. *Journal of the American Medical Directors Association*, 15(3), 220–225. [PubMed: 24355078]
- Koller D, Hua T, & Bynum J (2016). Treatment patterns with anti-dementia drugs in the United States: Medicare Cohort Study. *Journal of the American Geriatrics Society*, 64(8), 1540–1548. [PubMed: 27341454]
- Kwon I, Bharmal N, Choi S, Araiza D, Moore M, Trejo L, & Sarkisian C (2016). Older ethnic minority women's perception of stroke prevention and walking. *Women's Health Issues*, 20(1), 80–86.
- Landry G, Falck R, Beets M, & Liu-Ambrose T (2015). Measuring physical activity in older adults: Calibrating cut-points for the MotionWatch 8(c). *Frontiers in Aging Neuroscience* Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4548198/>. Last accessed June, 2019.

- Lapane K, Quilliam BJ, Chow W, Kim M,. (2012). The association between pain and measures of well being among nursing home residents. *Journal of the American Medical Directors Association*, 13(4), 344–349. [PubMed: 21450246]
- Lastrucci V, Lorini C, Rinaldi G, & Bonaccorsi G (2018). Identification of fall predictors in the active elderly population from the routine medical records of general practitioners. *Primary Health Care Research & Development*, 19(2), 131–139. [PubMed: 28870275]
- Leung P, Ejupi A, van Schooten K, Aziz O, Feldman F, Mackey D, ... Robinovitch S (2017). Association between sedentary behaviour and physical, cognitive, and psychosocial status among older adults in assisted living. *BioMed Research International*. Available at: <https://www.ncbi.nlm.nih.gov/pubmed/28913360>. Last accessed June, 2019.
- Lin Y, Yeh M, Chen Y, & Huang I (2010). Physical activity status and gender differences in community dwelling older adults with chronic disease. *Journal of Nursing Research*, 18, 88–97. [PubMed: 20592654]
- MacLagan L, Maxwell C, SGandhi S, Guan J, Bell C, Hogan D, ... Bronskill S (2017). Frailty and potentially inappropriate medication use at nursing home transition. *Journal of the American Geriatrics Society*, 65(10), 2205–2212. [PubMed: 28752589]
- Mahoney F, & Barthel D (1965). Functional evaluation: The Barthel Index. *Maryland State Medical Journal*, 14(2), 61–66.
- Maust D, Langa K, Blow F, & Kales H (2017). Psychotropic use and associated neuropsychiatric symptoms among patients with dementia in the USA. *International Journal of Geriatric Psychiatry*, 32, 164–174. [PubMed: 26889640]
- Midado L, Giardini A, Menditto E, Kardas P, & Costa E (2018). Polypharmacy prevalence among older adults based on the survey of health, ageing and retirement in Europe. *Archives of Gerontology and Geriatrics*, 78, 213–220. [PubMed: 30015057]
- Morgan S, Weymann D, Pratt B, Smolina K, Galdstone E, Raymond C, & Mintzes B (2016). Sex differences in the risk of receiving potentially inappropriate prescriptions among older adults. *Age & Ageing*, 45(4), 535–542. [PubMed: 27151390]
- Naylor M, Hirschman K, Hanlon A, Abbott K, Bowles K, Foust J, ... Zubritsky C (2016). Factors associated with changes in perceived quality of life among elderly recipients of long-term services and supports. *Journal of the American Medical Directors Association*, 17(1), 44–52. [PubMed: 26412018]
- Niclós G, Olivar T, & Rodilla V (2018). A cross-sectional evaluation of the prevalence and detection of predictors of polypharmacy amongst adult in Spain. *International Journal of Pharmacy Practice*, 26(3), 242–249. [PubMed: 28795462]
- Onunkwor O, Al-Dubai S, George P, Yadav A, Barua A, & Shuaibu H (2016). A cross-sectional study on quality of life among the elderly in non-governmental organizations' elderly homes in Kuala Lumpur. *Health and Quality of Life Outcomes*, 14(6), 1–10. [PubMed: 26744040]
- Oshio T, & Oshio T (2012). Gender differences in the associations of life satisfaction with family and social relations among the Japanese elderly. *Journal of Cross-Cultural Gerontology*, 27(3), 259–274. [PubMed: 22648323]
- Pauelsen M, Nyberg L, Roijezon U, & Vikman I (2018). Both psychological factors and physical performance are associated with fall-related concerns. *Aging Clinical & Experimental Research*, 30(9), 1079–1085. [PubMed: 29264814]
- Phillips L, Petroski G, Conn V, Brown M, Leary E, Teri L, & Zimmerman S (2018). Exploring Path models of disablement in residential care and assisted living residents. *Journal of Applied Gerontology*, 37(12), 1490–1516. [PubMed: 27708073]
- Pruitt LA, Glynn NW, King AC, Guralnik JM, Aiken EK, Miller G, & Haskell WL (2008). Use of accelerometry to measure physical activity in older adults at risk for mobility disability. *Journal of Aging and Physical Activity*, 16(4), 416–434. [PubMed: 19033603]
- Read S, Grundy E, & Foverskov E (2016). Socio-economic position and subjective health and well-being among older people in Europe: A systematic narrative review. *Aging & Mental Health*, 20(5), 529–542. [PubMed: 25806655]

- Resnick B, Galik E, Boltz M, Holmes S, Vigne E, & Fix S (2018). Physical Activity and Function in Assisted Living Residents. *Western Journal of Nursing Research*, 40(12), 1734–1748. [PubMed: 29560808]
- Resnick B, Galik E, Gruber-Baldini A, & Zimmerman S (2011a). Testing the effect of Function-Focused Care in Assisted Living. *Journal of the American Geriatrics Society*, 59(12), 2233–2234. [PubMed: 22091790]
- Resnick B, Galik E, Gruber-Baldini A, & Zimmerman S (2011b). Implementing a restorative care philosophy of care in assisted living: Pilot testing of Res-Care-AL. *Journal of the American Academy of Nursing Practitioners*, 21(2), 123–33.
- Resnick B, Gruber-Baldini A, Aboff-Petzer I, Galik B, Russ K, & Zimmerman S (2007). Reliability and Validity of the Evaluation to Sign Consent Measure. *The Gerontologist*, 47(1), 69–77. [PubMed: 17327542]
- Resnick B, Kolanowski A, Van Hartsma K, Galik E, Boltz M, Ellis J, ... Zhu S (in press). Current Psychotropic Medication Use and Contributing Factors Among Nursing Home Residents with Cognitive Impairment. *Clinical Nursing Research*, 4 3, 2019 online.
- Rozenfeld S, Fonseca M, & Acurcio F (2008). Drug utilization and polypharmacy among the elderly: A survey in Rio de Janeiro City, Brazil. *Revista Panamericana de Salud Publica*, 23(1), 34–43. [PubMed: 18291071]
- Sandlund M, Pohl P, Ahlgren C, Skelton D, Melander-Wikman A, Bergvall-Kåreborn B, & Lundin-Olsson L (2018). Gender perspective on older people's exercise preferences and motivators in the context of falls prevention: A qualitative study. *BioMed Research International*, 1–11.
- Sandvik R, Selbaek G, Kirkevold O, Shusebo B, & Aarsland D (2016). Analgesic prescribing patterns in Norwegian nursing homes from 2000–2011: Trend analyses of four data samples. *Age and Ageing*, 45, 54–60. [PubMed: 26764395]
- Shaw B, Liang J, Krause N, Gallant M, & McGeever K (2010). Age differences and social stratification in long term trajectories of leisure time physical activity. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, 65, 756–766. [PubMed: 20855534]
- Sikorska-Simmons E (2001). Development of an instrument to measure resident satisfaction with assisted living. *Journal of Applied Gerontology*, 20(1), 57–73.
- Small B, Dixon R, McArdle J, & Grimm K (2012). Do changes in lifestyle engagement moderate cognitive decline in normal aging? Evidence from the Victorian Longitudinal Study. *Neuropsychology*, 26(144), 1–10. [PubMed: 22122516]
- Sole-Auro A, Jasilionis D, Li P, & Oksuzyan A (2018). Do women in Europe live longer and happier lives than men? *European Journal of Public Health*, 28(5), 847–857. [PubMed: 29741676]
- Sotoudeh G, Mohammadi R, Mosallanezhad Z, Viitasara E, & Soares J (2018). The prevalence, circumstances and consequences of unintentional falls among elderly Iranians: A population study. *Archives of Gerontology & Geriatrics*, 79, 123–130. [PubMed: 30205318]
- The 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. (2019). American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. *Journal of the American Geriatrics Society*. Available at: <https://onlinelibrary.wiley.com/doi/pdf/10.1111/jgs.15767> Last accessed June, 2019.
- Ullrich P, Eckert T, Bongartz M, Werner C, Kiss R, Bauer J, & Hauer K (2019). Life-space mobility in older persons with cognitive impairment after discharge from geriatric rehabilitation. *Archives of Gerontology and Geriatrics*, 81, 192–200. [PubMed: 30605862]
- United States Preventive Services Taskforce. (2018). Final Recommendation statement: aspirin use to prevent cardiovascular disease and colorectal cancer: preventive medication. Available at: <https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/aspirin-to-prevent-cardiovascular-disease-and-cancer>. Last accessed June, 2019.
- Vieira de Sousa J, Stremel F, Isadora A, Grden B, Regina C, de Oliveira Borges... de Oliveira da Silva J (2016). Risk of falls and associated factors in institutionalized elderly. *Revista da Rede de Enfermagem do Nordeste*, 17(3), 416–421.

- Viktil K, Moger T, & Reikvam A (2007). Polypharmacy as commonly defined is an indicator of limited value in the assessment of drug-related problem. *British Journal of Clinical Pharmacology*, 63(2), 187–195. [PubMed: 16939529]
- Vitorino L, Paskulin L, & Vianna L (2012). Quality of Life among older adults resident in long-stay care facilities. *Latin American Journal of Nursing*, 20(6), 1186–1195.
- Zhang W, Feng Q, Lacanienta J, & Zhen Z (2017). Leisure participation and subjective well-being: Exploring gender differences among elderly in Shanghai, China. *Archives of Gerontology and Geriatrics*, 69, 45–54. [PubMed: 27888735]
- Zimmerman S, Anderson WL, Brode S, Jonas D, Lux L, Beeber AS Sloane PD (2013). Systematic review: Effective characteristics of nursing homes and other residential long-term care settings for people with dementia. *Journal of the American Geriatrics Society*, 61, 1399–1409. [PubMed: 23869936]

Table 1

Multivariate Analysis and Description of Outcomes by Gender (bolded outcomes significant at the p .05 level)

Variable	Male Mean (SD)	Female Mean (SD)	Total Mean (SD)	F	p
Age	88 (8.10)	89 (7.24)	88 (7.19)	1.97	.16
Comorbidities	5 (2.00)	5 (2.01)	5 (2.00)	.019	.89
Medications	6.34(3.31)	7.09(3.51)	6.88 (3.47)	2.09	.05
Health Satisfaction With Care	3.60(.74)	3.58(.85)	3.59 (.81)	.05	.81
Physical Environment Satisfaction	4.27(.89)	4.38(.94)	4.35 (.93)	1.11	.29
Relationship with Staff Satisfaction	7.09(1.23)	7.09(1.29)	7.09 (1.27)	.001	.89
Satisfaction with Activities	3.85(1.51)	4.32(1.14)	4.19 (1.28)	10.28	.01
Function	65.45(17.60)	63.58(19.68)	64.13 (19.09)	.73	.39
Moderate level physical activity	41.92(76.94)	45.67(75.30)	43.80 (76.12)	.19	.67
Falls	N (%)	N(%)		.001	.98
Yes	41(25%)	101(25%)	142 (25%)		
No	125(75%)	326(75%)	326 (75%)		

Table 2

Differences in Medication Use By Gender

Medication	Male	Female	χ^2	P*
Cholinesterase Inhibitors			1.79	.18
Yes	22(13%)	76(18%)		
No	144(87%)	351(82%)		
Parkinson's Medications			.10	.76
Yes	9(5%)	26(6%)		
No	157(95%)	401(94%)		
Urinary Incontinence Medications			.98	.32
Yes	12(7%)	42(10%)		
No	154(93%)	385(90%)		
Steroids			7.22	.007
Yes	40(24%)	152(36%)		
No	126(76%)	275(64%)		
Osteoporosis Medications			12.22	.001
Yes	56(34%)	212(50%)		
No	110(66%)	215(50%)		
Cardiovascular Medications			5.61	.018
Yes	48(29%)	168(39%)		
No	118(71%)	259(61%)		
Diabetes Medications			.001	.99
Yes	28(17%)	72(17%)		
No	138(83%)	355(83%)		
Antilipid Medications			1.28	.29
Yes	76(46%)	175(41%)		
No	90(54%)	252(59%)		
Anticoagulants			3.29	.07
Yes	88(53%)	191(45%)		
No	78(47%)	236(55%)		
Anemia Medication			.44	.51
Yes	24(15%)	53(12%)		
No	142(85%)	374(88%)		
Pain Medication (including opioids)			8.67	.003
Yes	30(18%)	128(30%)		
No	136(82%)	299 (70%)		
Opioids Only			3.00	.08
Yes	6(4%)	32(8%)		
No	160(96%)	395(92%)		

Medication	Male	Female	χ^2	P*
Seizure Medication			.06	.81
Yes	32(19%)	86(20%)		
No	134(81%)	341(80%)		
Gastrointestinal Medications			2.52	.112
Yes	88(53%)	257(60%)		
No	78(47%)	170(40%)		
Anxiolytics			6.16	.013
Yes	5(3%)	38(9%)		
No	161(97%)	389(91%)		
Antidepressants			8.09	.004
Yes	53(32%)	191(45%)		
No	113(68%)	236(55%)		
Antipsychotics			1.87	.171
Yes	21(13%)	38(9%)		
No	145(87%)	389(91%)		
Sedative Hypnotics			1.51	.22
Yes	7(4%)	10 (2%)		
No	159(96%)	417(98%)		

*
p<.05