



2020

Aging in Place: Causes and Importance of Fall Prevention Education

Molly Banks

Danielle Halstead

Mariah LeRoux

Follow this and additional works at: <https://commons.und.edu/cat-papers>



Part of the [Occupational Therapy Commons](#)

Recommended Citation

Banks, Molly; Halstead, Danielle; and LeRoux, Mariah, "Aging in Place: Causes and Importance of Fall Prevention Education" (2020). *Critically Appraised Topics*. 5.

<https://commons.und.edu/cat-papers/5>

This Critically Appraised Topic is brought to you for free and open access by the Department of Occupational Therapy at UND Scholarly Commons. It has been accepted for inclusion in Critically Appraised Topics by an authorized administrator of UND Scholarly Commons. For more information, please contact und.common@library.und.edu.

Aging in Place: Causes and Important of Fall Prevention Education

Molly S. Banks, OTS, Danielle G. Halstead, OTS, & Mariah B. LeRoux, OTS

Department of Occupational Therapy, University of North Dakota, Grand Forks, North Dakota, United States

Please direct correspondence to Molly Banks at molly.banks@ndus.edu

Danielle Halstead at daniellie.g.halstead@ndus.edu

Mariah LeRoux at mariah.leroux@und.edu

***This resource was written by doctoral-level students in fulfillment of the requirements of the Occupational Therapy course “OT 403 - Clinical Research Methods in Occupational Therapy” at the University of North Dakota School of Medicine and Health Sciences, under the advisement of Professor/Course Director Anne Haskins, Ph.D., OTR/L, Assistant Professor Breann Lamborn, EdD, MPA, Professor Emeritus Gail Bass Ph.D., OTR/L, and Research and Education Librarian Devon Olson Lambert, MLIS.



Banks, M., Halstead, D., & LeRoux, M., 2020

©2020 by Banks, Halstead, & LeRoux. This work is licensed under the Creative Commons Attribution International license (CC BY). To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>

Focus Question:

How will implementing fall education programs reduce the risk of falls in community dwelling older adults age 60 and above so that they are able to maintain the daily occupations that allow them to age in place?

Clinical Scenario:

According to the Center for Disease Control and Prevention, three million adults aged 60 and older fall every year, with one in five resulting in severe injury (2017). In total, the medical cost for falls totaled more than \$50 million in 2015 (Center for Disease Control and Prevention, 2017). Risk factors such as malnutrition, dehydration, medication side effects, lower body weakness, vision problems, and balance difficulties increase an individual's chances of suffering from a fall (Center for Disease Control and Prevention, 2017). This interferes with an older individual's ability to effectively age in place. The ability of an individual to independently live in their home and community regardless of age, income, or ability level is how The Center for Disease Control and Prevention (2009) defines aging in place. According to an AARP survey in 2018, 75% of adults 50 and older prefer to stay in their homes (Binette & Vasold, 2019).

Dehydration is one of the highest risk factors associated with falls. It is shown to be associated with comorbidity, longer hospital stays, and other factors related to higher mortality rates (Fortes et al., 2015). Medications can also be affected by the level of dehydration an individual is experiencing. When levels are very low, medication effects can be amplified. Side effects of medication can also affect an individual's functional ability causing factors such as sleepiness, fatigue, unsteady balance, and increased fall/fractures risk (Eisenhower, Koronkowski, & Marcum, 2016). Malnutrition is also a risk factor for falls in the aging population. The risk for malnutrition is greater in older adults because of the inability to access resources that meet their nutritional needs (Walton, Rosario, Pettinghill, Cassimatis, & Charlton, 2019). Higher protein intake and healthy foods are necessary for this population to support the recovery of illness and the functionality of their body to reduce frailty (Walton et al., 2019). Normal aging functions, such as frailty and sarcopenia, can be rapidly increased due to a lack of nutritional intake (Houston et al., 2008).

With falls being the leading cause of death in aging in place adults, occupational therapy's role in educating and utilizing community resources are two of the most vital elements of therapy services. Looking at how the current population is aging and the influx of individuals who will be aging in place in the next few decades, this could impact the prevalence of education and community resources needed for these individuals. The Population Reference Bureau reported that the number of Americans ages 65 and older is projected to grow from 52 million in 2018 to 95 million in 2060 (Mather, Scommenga, & Kilduff, 2019). We approached this clinical scenario from the perspective of the Person-Environment-Occupation Model (PEO) to look at how each of these factors affect older adults' ability to safely age in place (Baptiste, 2017).

Purpose Statement

Falls are a significant concern for older community-dwelling adults' ability to age in place, specifically those who aged 60 and older. Many factors contribute to the risk of falls in older adults that need to be addressed by health care facilities, home health providers, and caretakers. Occupational therapy has a role to educate older adults, as well as health care providers on how to prevent the risk factors of older adults and falls. The purpose of this CAT is to take a deeper look at why this population has so many falls and examine the research



addressing education and risk factors for those older adults, age 60 and older who experience frequent falls (Baptiste, 2017).

Inclusion Criteria:

There were many articles obtained for this topic and while researching we had inclusion criteria in mind to guide our research. All of the articles that were used were dated within the past 20 years for relevance purposes, with the majority of articles published within the past 10 years. Articles were also included if the population in the study or review was over the age of 60 years old. Another inclusion criterion was including articles that mentioned aging in place or community-dwelling older adults. Our focus question targeted older adults aging in place and this is the age and living situation that correlates with the focus question. Articles were later included involving nursing homes for possible application to aging in place and community-dwelling populations.

The main highlight in the focus question related to falls. Articles were included if they talked about falls in general and especially if it related falls to dietary intake, hydration status, quality of sleep, fall prevention, risk factors for falls and the home environment of these aging in place as community dwelling older adults. Falls can be caused by a number of factors, so we did not limit the reasoning for falls and included many articles regarding all aspects of falls in the aging in place/community-dwelling older adult population (our target population). Articles were also included when they related to medication and our target population and how medications relate to falls. Lastly, articles were included if they related to the education and the effectiveness of it for the aging in place/community-dwelling older adult population, and what kind of environments are best suited for this population to learn in.

Exclusion Criteria:

While there were many things that we included about articles in this review, there were also articles excluded from the review. The population of interest was older adults, so articles that related to individuals younger than 60 years of age were excluded. Articles were excluded if they related falls to dementia, other mental health complications that have to do with aging, or visual impairments. Articles were also excluded if they looked at concepts on a biomedical basis rather than a functional and occupational basis. Adults aging in place is the primary population of this review so articles that did not relate to aging in place were excluded, and of those articles, aging in place unrelated to falls were also excluded.

Search Terms

To find these articles we first started by looking at falls and the aging in place population. We searched phrases like ‘aging in place; problems’: 219, ‘aging in place’: 3460, ‘Aging in place; falls’: 93, “‘aging in place’: falls; ‘community dwelling’”: 326, “‘aging in place’: ‘cross-cultural’”: 38, “‘aging in place’: compromise’: 30, and “‘aging in place’: falls’: 627 through CINAHL. We also searched into some of the possible causes to falls ‘dehydration in older adults’: 105, ‘Malnutrition in older adults’: 3822, and ‘Malnutrition; older adults’: 687, ‘aging in place; falls; malnutrition’: 8, ‘Causes of falls; Occupational Therapy’: 9, ‘Malnutrition; Aging in place’: 9, ‘Falls; dehydration’: 126, ‘Medication affects; aging in place’: 2, ‘Cause of falls; Occupational Therapy’: 23, and ‘Environmental barriers; Aging in place’: 10 through the CINAHL database as well.



There were also searches related to falls and possible prevention strategies. These searches included “aging in place”; falls; intervention’: 187, ‘education; falls; aging in place’: 16, and “aging in place”; resources’: 124. We searched ‘Malnutrition in older adults’: 3822 and ‘Aging in place’: 38, and ‘Fall prevention; “aging in place”’: 12 through the PubMed database. Upon review of findings, ancestry searching was completed to find additional information on topics and to find the original studies conveying the information needed from various articles.

Summary of Study Designs and Articles Retrieved

A total of 21 articles

Table 1: Summary of Relevant Articles Reviewed

Study Design/Methodology	Level of Evidence	Participants	Author/Year
Systematic review & meta-analysis	I	59 articles	(Lusardi et al., 2017)
Systematic review & meta-analysis	I	5 articles	(Trevisan et al., 2019)
Meta-analysis	I	4,844	(Streicher et al., 2018)
Systematic Review	I	13 articles	(Walton, Rosario, Pettinghill, Cassimatis, & Charlton, 2020)
Randomized Control Trial	I	60	(Sheffield, Smith, & Becker, 2013)
Randomized single blind within-subject design	I	40	(Dermiki et al., 2015)
Pretest-Posttest	III	79	(Ullevig et al., 2018)
Cross sectional	IV	130	(Fortes et al., 2015)
Retrospective Study	IV	711	(Chippendale, Gnetile, & James 2017)
Retrospective case-control study	IV	50	(Anderson & Lane, 2020)
Cohort Study	IV	199	(Kallin, Jensen, Olsson, Nyberg, & Gustafson, 2004)



Audit/Cohort Study	IV	34	(Hendry & Ogden, 2016)
Qualitative study	NA	35	(Greene, Sample, & Fruhauf, 2009)
Qualitative study	NA	68	(Lindquist et al., 2016)
Qualitative study	NA	1,050	(Russell, Taing, & Roy, 2017)
Qualitative Study	NA	68	(Huls, Rooij, Diepstraten, Koopmans, & Helmich, 2015)
Case Study	NA	7	(Mitchell et al., 2015)
Exploratory Case Study	NA	1937	(Chen, Lee, Chang, & Walqvist, 2011)
Cross-sectional analysis of longitudinal study	NA	9843	(Min, Nadpara, & Slatten, 2016)
Phenomenological Survey	NA	1526	(Brassington, King, & Bliwise, 2000)
Semi-structured focus group	NA	30	(Whitelock & Ensaff, 2018)

*some articles were not included because they were used as supporting literature to back up findings

Synthesizing Summary:

If given a choice, aging in place is the ideal option for most people (Galambos et al., 2017; Köing, Raue, D'Ambrosio, & Coughlin, 2019; Wiles, Leibing, Guberman, Reeve, & Allen, 2012). It gives individuals a sense of identity and independence (Wiles et al., 2012). One factor that may prevent individuals from aging in place is falling. Falls are a common occurrence among older adults, with approximately 30% to 40% of adults aged 65 and older suffering from at least one fall each year (Center for Disease Control and Prevention, 2017; Kelsey, Procter-Gray, Hannan, & Li, 2012). Falls are also one of the most common causes of emergency room visits, with the number of older adults receiving care in the emergency department increasing by more than 20% since 2001 (Chippendale, Gnetile, & James 2017). There are many possible factors that result in falls among older adults (Lusardi et al., 2017). Some of these potential factors for risks of falls include malnutrition, dehydration, medication, and other factors. Knowing and understanding the implications of these risk factors will help implement effective fall education programs and promote aging in place.

Malnutrition or being at risk for malnutrition may increase the risk of having a fall as it relates to aging and chronic diseases (Abizanda, Sinclair, Barcons, Lizán, & Rodríguez, 2016; Trevisan et al., 2019). Malnutrition is a risk factor for falls because an inadequate intake of



nutrients, especially proteins, will accelerate the physiological decline in muscle mass (Houston et al., 2008). A decline in muscle mass will ultimately lead to weakness and walking instability, which are risk factors of falls (Trevisan et al., 2019). Due to old age, individuals have smaller appetites and decreased physical functional abilities to make meals, and end up making simpler, smaller meals with fewer nutrients (Whitelock & Ensaff, 2018).

According to Whitelock and Ensaff (2018) loneliness was another factor of malnutrition that was noted as significant. Due to feelings of loneliness, older adults were less likely to make meals and eat because mealtimes used to be a social and enjoyable time, and now it has a negative connotation. Food packaging and portion sizes are also contributing factors to why older adults may eat less. Food packets that are too large for one person to eat discourage them from buying, because they grew up in an era where they avoided wasting food. Older adults also tend to manage their weight by dieting, which causes them to avoid foods high in fat and sugar, eliminating important nutrients in their diet (Whitelock & Ensaff, 2018). Overall, meal preparation has shown to have a positive effect on overall life outcomes by decreasing frailty and increasing independence (Chen, Lee, Chang, & Walqvist, 2011). Although many reasons for the lack of meal preparation have to do with frailty and motivation, there are also biological changes in the elderly population that can influence their ability to make meals (Chen et al., 2011; Trevisan et al., 2019).

Malnutrition in older adults is also common because the accessibility and physical ability to make food with key nutrients is difficult for an aging adult (Walton, Rosario, Pettinghill, Cassimatis & Charlton, 2020). Home delivered meals (HDM) is an option for those individuals who can afford it and have the community resources to do so. HDM services have shown significant improvement in the quality of diet, nutrient intake, and nutritional risk in the older adult population (Walton et al., 2020; Ullevig et al., 2018). Improvement in nutrition and HDM shows an increase in quality of life outcomes in aging individuals (Walton et al., 2020). Having accessible resources like HDM allows aging adults to comfortably age in place without having to worry about meeting nutritional needs on their own.

Determinants of malnutrition that may lead to falls include difficulty walking, climbing stairs, prior hospitalization, and hospitalization during follow-up visits (Streicher et al., 2018). Becoming aware and knowing these determinants will assist in preparing intervention strategies to avoid malnutrition and falls (Streicher et al., 2018). This population of older adults typically has decreased appetite and eats smaller meals which can lead to malnutrition (Whitelock & Ensaff, 2018). To combat this, a study conducted by Dermiki et al. (2015), showed significant results in adding MSG to food and its effect on increased appetite and consumption in the aging population. MSG refers to monosodium glutamate and has shown promising effects for increasing liking, appetite and consumption of food (Dermiki et al., 2015). Knowing the effects of MSG can greatly help the older adult population gain the proper nutrition that they need.

While there is a significant amount of literature on maintaining good nutrition for the elderly population, information focused on hydration seemed scarce (Henry & Ogden, 2016). Despite being relatively easy to treat, dehydration is frequently missed and, as a result, many people are hospitalized due to advanced dehydration, which can exacerbate medical conditions and falls (Pinto & Schub, 2013, as cited in Hendry & Ogden, 2016). Dehydration is associated with falls, longer hospital stays, and other factors that lead to higher mortality rates (Fortes et al., 2015). Symptoms of dizziness, agitation, and confusion from dehydration can have a profound effect on the individual's ability to mobilize and on their risk of falls (Pinto & Schub 2013, as cited in Hendry & Ogden, 2016).



Pinto and Schub (2013) as cited in Hendry and Ogden (2016) state that older adults are more at risk of dehydration because they have a diminished thirst sensation, a decline in kidney function and functional impairment. In a study by Henry & Ogden (2016), an audit conducted revealed that only nine of the 34 residents in an aged residential care facility received the minimum required amount of fluid intake in 24 hours, recommendations were made to make hydration become a focal point of the daily routine. Dehydration is a common problem in older adults that goes unnoticed but is a severe risk relating to falls, especially in the aging adult population.

Dehydration is a concern because it affects approximately 20% to 30% of older adults and there is no 'gold-standard' test of dehydration in individuals, therefore more research is needed (Fortes et al., 2015; Miller, 2015). The current means of testing for dehydration include blood samples and urine tests. However, they are too invasive, take longer to receive results, and are not able to discriminate between dehydration and a properly hydrated individual (Fortes et al., 2015). There are also saliva tests, and while more research needs to be done, they appear to be promising screening tools (Fortes et al., 2015). Fortes et al. (2015) also found that saliva osmolarity was able to detect dehydration in healthy individuals and that this could be used as a possible screening method for dehydration in older adults.

Along with hydration and nutrition, medication falls within the daily routine of most older adults. Medication when coupled with dehydration, another fall risk factor, can have physical side effects like fatigue, dizziness, and stability (Eisenhower, Koronkowski, & Marcum, 2016). In a study conducted regarding falls in a residential care facility, sleeping medication given at the wrong time, or too soon before the resident went to bed, resulted in 7 residents falling (Kallin, Jensen, Olsson, Nyberg, & Gustafson, 2004). However, there are mixed results relating to sleep medications and their effect on falls (Min, Nadpara, & Slattum, 2016). Research on medications and falls found that antidepressants significantly increased the risk of falls in aging adults (Anderson & Lane, 2020; Kallin et al., 2004). Some medications may not have a direct effect on their own but combined with other drugs and physical states cause a significant risk to the aging population (Kallin et al., 2004; Min et al., 2016).

Based on the research and literature, many other factors impact falls. The time of day has been suggested to impact falls. A study by Anderson and Lane (2020) found that falls occurred during the day, more specifically during the afternoon and evening hours. Greene, Sample, and Fruhauf (2009) reported that illumination was a hazard; however, it is not possible to determine what illumination level represents a hazard, as no studies have reported actual measures of illumination thought to be dangerous at either extreme. Two of their findings did show that community-dwelling older adults' falls occurred in daylight and all three home evaluations lighting measurements indicated illumination at the high end of the scale (Greene et al., 2009).

Marital status was associated as well with the risk of falls. A married individual was found less likely to fall compared to a widowed, divorced, or single individual (Anderson & Lane, 2020). Marital status or living status was also related to mealtime eating and proper nutrition, finding those that lived alone were less likely to cook nutritious meals when they only cooked for one (Whitelock & Ensaff, 2018). Mitchell et al. (2015) noted in their study looking at individuals and their fall risks, that daily activities in combination with the faller's fearfulness, anxiety, stress, or fierce determination to be independent increased their chances of falls. In that same study looking at individuals and their fall risks, a caregiver of one participant was quoted saying, "I don't know if there is any real way you could prevent or improve (safety for community seniors) because there is still an independent minded person. It is just something that

is going to happen” (Mitchell, et al., 2015, p. 403-404). These are all important considerations to keep in mind when considering fall intervention programs or designing one.

Knowledge of potential risks is vital to the prevention, and education of the aging population. There is a lack of definitive evidence supporting best practices for the evaluation of clients, their homes, and dispensing information (Greene et al., 2009). Increasing an individual’s sense of caution, teaching problem solving, and generalizing safety concepts is an idea to reduce the risk rather than using specific hazard-based definitions and elimination, such as simply recommending removing rugs or moving furniture in the home (Greene et al., 2009).

Chippendale et al. (2017) identified in their study that the older someone is, as they age in place, the more likely one was to be discharged to facilities, after a fall, where preventative methods for falls may be taught compared to those younger in this category who return home without services. Falls occurring in these healthy community-dwelling adults represent difficult-to-predict fall circumstances, which are quite different from falls in nursing homes and assisted-living facilities, where it is difficult to provide relevant fall-prevention recommendations (Greene et al., 2009).

Due to the lack of information that pertains to education for occupational therapists regarding fall prevention, studies were found looking at other occupations working with individuals 60 years and older. Huls, Rooij, Diepstraten, Koopmans, and Helmich (2015) conducted a study addressing having medical students gain experience in nursing homes compared to old hospitals, and they found that nursing homes provided more advanced specific geriatric medical knowledge, deliberate decision making/clinical reasoning, interprofessional collaboration, end of life care, and communication for geriatric/aging in place individuals. Specifically, communication, with the individual who is at risk for falls, can be a very essential step in the process of education to prevent falls from occurring or reoccurring. Mitchell et al., (2015) in their study about individuals with fall risks found that communication, about fall prevention, was incomplete with community-living older adults as there was an unrealistic expectation to recall instructions, which led to poor follow-up by the faller or their caregiver.

Knowing and understanding the implications of fall risk factors will aid the development of effective fall education programs to help older adults age in place. Falls are a common occurrence among older adults with a prevalence rate of 30% to 40% of one fall each year (Center for Disease Control and Prevention, 2017; Kelsey et al., 2012). With falls being a common deterrent of aging in place it is important to know the common risk factors such as malnutrition, dehydration, medication, and other factors. The research found that there is a gap in knowledge regarding effective fall prevention education and aging place (Anderson & Lane, 2020; Greene et al., 2009). Aging in place is the preferred option for most older adults and implementing effective fall prevention programs will help aid in making it possible (Galambos et al., 2017; Köing et al., 2019; Wiles et al., 2012).

Summary of Best Evidence

Aims of studies included

The purpose and aims of the studies included topics such as determining the risk of falls, the characteristics of falls, the incidence and characteristics of malnutrition in older adults, prevalence and characteristics of dehydration, awareness of fall prevention strategies/recommendations, and current educational strategies for the aging adult population.



Study Designs

The study designs that were found in our articles included randomized control trials, retrospective case-control study, meta-analysis, survey, systematic review, focus groups, cohort study, cross sectional study, and pretest-posttest, and qualitative studies.

Clinical Applicability

The occupational theory that was used to approach this clinical scenario was the Person-Environment-Occupation Model (PEO) (Baptiste, 2017). This occupation-based model incorporates the person, environment, and occupation into an overall “fit”. The “fit” looks at how each component works together to improve the independence of an individual, in those three areas and assess occupational performance (Baptiste, 2017). Occupational performance is an individual’s ability to engage in and participate in the activities (occupations) that they enjoy doing (Baptiste, 2017). These factors provide a map to assess a client’s situation and help to improve their independence.

The clinical population researched, was older adults, aged 60 and older, and their ability to age in place, as it is the preferred choice among most older adults. An AARP survey of adults aged 50 and older found 75% of them would choose to age in their homes (Binette & Vasold, 2019). In much of our research, the population we focused on was older adults aged 60 and older. This population is most likely considering aging in place or currently is aging in place. The environment of this population includes family homes and the community. Falls common in this population prevent aging in place, common risk factors for falls include malnutrition, dehydration, medication side effects, lower body weakness, vision problems, and balance difficulties. The purpose of this CAT is to take a deeper look at why this population has so many falls and examine the research addressing education and risk factors for those older adults, aged 60 and older who experience frequent falls to ensure a proper “fit” (Baptiste, 2017).

There is research and knowledge about the effects of malnutrition, but more research needs to be done on its connection to aging in place. Malnutrition is a common occurrence in older adults because of both physiological changes and social changes. Older adults tend to have smaller appetites and eating becomes more of a hassle when their physical mobility declines, negatively impacting their occupational performance of not only feeding, but home mobility as well (Baptiste, 2017; Chen et al., 2011; Houston et al., 2008; Trevisan et al., 2019; Whitelock & Ensaff, 2018). Meals are also seen as less social than they once were, therefore decreasing the desire to eat or make large meals (Whitelock & Ensaff, 2018). Home delivered meals have been shown to increase nutrition and protein intake in this older population and has eliminated the obstacle of going to the grocery store because meals are delivered to their homes (Walton et al., 2020; Ullevig et al., 2018). There are also gaps in knowledge regarding the effects of dehydration and medication on falls (Anderson & Lane, 2020; Kallin et al., 2004; Min et al., 2016). Dehydration is typically overlooked as a risk factor for falls; however, dehydration has shown to cause implications such as dizziness or confusion, as well as exaggerates medication side effects causing a higher risk of falls (Pinto & Schub, 2013, as cited in Hendry & Ogden, 2016). However, there are mixed results on medications' ability to increase fall risks (Kallin et al., 2004; Min et al., 2016).

The consensus of the research conducted indicated that there is a gap in knowledge concerning effective fall prevention education regarding aging in place (Anderson & Lane, 2020; Friesen, 2017; Russell, Taing, & Roy, 2017). Several conclusions were made stating, for instance, older individuals may lack the resources and knowledge to reduce fall risks, or plan for



them to occur and intervention is more effective if tailored to groups of individuals or a certain population (Anderson & Lane, 2020; Kelsey et al., 2012; Lindquist et al., 2016; Russell et al., 2017). Overall, the effectiveness of patient education on general fall prevention strategies has mixed results, indicating that more research is needed to prevent falls and their risk factors to promote healthy aging in place (Lindquist et al., 2016; Greene et al., 2009). This research points to our initial focus question about implementing fall education programs to reduce the risk of falls in the aging population. It shows the lack of programs and the effectiveness of these current programs and the unfamiliarity of resources available to these individuals.

This is useful to know for practice because many of the clients aged 60 and older that occupational therapists see are injured due to falls. Developing and implementing an interprofessional fall prevention education program will be essential for stakeholders and healthcare professionals. This interprofessional prevention plan would include multiple disciplines including physicians to diagnose malnutrition and dehydration, psychiatry to manage patient medication side effects, occupational and physical therapy to help the fall recovery, occupational therapy and social work to educate clients about falls and speech-language pathology to work with dehydration and swallowing difficulties in clients. While the research was done across the board, three students with an occupational therapy bias conducted research. However, we do see the potential for many professions to benefit from this research, keeping in mind the different specialties each profession would bring, to prevent potential biases.

Overall malnutrition, dehydration, and medication side effects are risks for factors for falls, a major factor impairing the ability to age in place. There are few education programs available for older adults, aged 60 and older. Therefore, these factors need to be implemented in fall prevention programs to educate those older adults. This will ultimately help to reduce the risk and number of falls in older adults aged 60 and older and promote aging in place.

References

- Abizanda, P., Sinclair, A., Barcons, N., Lizán, L., & Rodríguez-Mañas, L. (2016). Costs of malnutrition in institutionalized and community-dwelling older adults: A systematic review. *Journal of the American Medical Directors Association, 17*(1), 17–23.
<https://doi.org/10.1016/j.jamda.2015.07.005>
- Anderson, L. K., & Lane, K. (2020). Characteristics of falls and recurrent falls in residents of all aging in place community: A case-control study. *Applied Nursing Research, 51*(1), N.PAG-N.PAG. <http://dx.doi.org.ezproxylr.med.und.edu/10.1016/j.apnr.2019.151190>
- Baptiste, S. (2017). The person-environment-occupation model. In J. Hinojosa, P. Kramer, & C. Royeen (Eds.), *Perspectives on human occupation: Theories underlying practice* (2nd ed.) (pp. 137-159). Philadelphia, PA: F.A. Davis.
- Binette, J., & Vasold, K. (2019). 2018 Home and community preferences: *A national survey of adults ages 18-Plus*. Retrieved from <https://www.aarp.org/research/topics/community/info-2018/2018-home-community-preference.html>
- Brassington, G. S., King, A. C., & Bliwise, D. L. (2000). Sleep problems as a risk factor for falls in a sample of community-dwelling adults 64-99. *Journal of the American Geriatrics Society, 48*(10), 1234-1240. <https://doi.org/10.1111/j.1532-5415.2000.tb02596.x>
- Center for Disease Control and Prevention. (2009). *Healthy places terminology*. Retrieved from <http://www.cdc.gov/healthyplaces/terminologyg.htm>
- Center for Disease Control and Prevention. (2017). *Important facts about falls*. Retrieved from <https://www.cdc.gov/homeandrecreationalafety/falls/adultfalls.html>
- Chen, R. C., Lee, M., Chang, Y., & Walqvist, M. L. (2011). Cooking frequency may enhance survival in Taiwanese elderly. *Public Health Nutrition, 15*(7), 1142-1149.
<http://doi:10.1017/S136898001200136X>
- Chippendale, T., Gentile, P. A., & James, M. K. (2017). Characteristics and consequences of falls among older adult trauma patients: Considerations for injury prevention programs. *Australian Occupational Therapy Journal, 64*(5), 350–357. <https://doi.org/10.1111/1440-1630.12380>
- Dermiki, M., Prescott, J., Sargent, L. J., Willway, J., Gosney, M. A., & Methven, L. (2015). Novel flavours paired with glutamate condition increased intake in older adults in the absence of change in liking. *Appetite, 90*(1), 108-113.
<http://dx.doi.org.ezproxylr.med.und.edu/10.1016/j.appet.2015.03.002>
- Eisenhower, C., Koronkowski, M., & Marcum, Z. (2016). Implications of recent drug approvals for older adults. *Annals of Long Term Care, 24*(1), 25–30. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4915388/>
- Fortes, M. B., Owen, J. A., Raymond-Barker, P., Bishop, C., Elghenzai, S., Oliver, S. J., & Walsh, N. P. (2015). Is this elderly patient dehydrated? Diagnostic accuracy of hydration assessment using physical signs, urine and saliva markers. *Journal of American Medical Directors Association, 16*(3), 221-228. <https://doi.org/10.1016/j.jamda.2014.09.012>
- Friesen, C. A. (2017). Seniors eating well: A sourcebook of lesson plans and activities for educating older adults about nutrition and health. *Journal of Nutrition Education and Behavior, 49*(9), 796-796. <http://dx.doi.org.ezproxylr.med.und.edu/10.1016/j.jneb.2017.06.011>
- Galambos, C., Rantz, M., Back, J., Jun, J. S., Skubic, M., & Miller, S. J. (2017). Older adults' perceptions of and preferences for a fall risk assessment system: Exploring stages of acceptance model. *CIN: Computers, Informatics, Nursing, 35*(7), 331–337.
<https://doi.org/10.1097/CIN.0000000000000330>



- Greene, D., Sample, P., & Fruhauf, C. (2009). Fall-prevention pilot: Hazard survey and responses to recommendations. *Occupational Therapy in Health Care*, 23(1), 24–39. <https://doi.org/10.1080/07380570802455532>
- Hendry, C., & Ogden, E. (2016). Hydration in aged residential care: A practical audit process. *Kai Tiaki Nursing Research*, 7(1), 41–45. Retrieved from <http://search.informit.com.au/documentSummary;dn=435618679271055;res=IELNZC>
- Houston, D. K., Nicklas, B. J., Ding, J., Harris, T. B., Tylavsky, F. A., Newman, A. B., . . . Kritchevsky, S. B. (2008). Dietary protein intake is associated with lean mass change in older, community-dwelling adults: The Health, Aging, and Body Composition (Health ABC) Study. *The American Journal of Clinical Nutrition*, 87(1), 150–155. <https://doi.org/10.1093/ajcn/87.1.150>
- Huls, M., Rooij, S. E., Diepstraten, A., Koopmans, R., & Helmich, E. (2015). Learning to care for older patients: Hospitals and nursing homes as learning environments. *Medical Education*, 49(3), 332–339. <https://doi-org.ezproxylr.med.und.edu/10.1111/medu.12646>
- Kelsey, J. L., Procter-Gray, E., Hannan, M. T., & Li, W. (2012). Heterogeneity of falls among older adults: Implications for public health prevention. *American Journal of Public Health*, 102(11), 2149–2156. <https://doi.org/10.2105/AJPH.2012.300677>
- König, K., Raue, M., D’Ambrosio, L. A., & Coughlin, J. F. (2019). Physical and emotional support of the neighborhood for older adults: A comparison of the United States and Germany. *Journal of Environmental Psychology*, 62, 84–94. <https://doi.org/10.1016/j.jenvp.2019.01.008>
- Lindquist, L. A., Ramirez-Zohfeld, V., Sunkara, P., Forcucci, C., Campbell, D., Mitzen, P., & Cameron, K. A. (2016). Advanced life events (ALEs) that impede aging-in-place among seniors. *Archives of Gerontology and Geriatrics*, 64, 90–95. <https://doi.org/10.1016/j.archger.2016.01.004>
- Lusardi, M. M., Fritz, S., Middleton, A., Allison, L., Wingood, M., Phillips, E., . . . Chui, K. K. (2017). Determining risk of falls in community dwelling older adults: A systematic review and meta-analysis using posttest probability. *Journal of Geriatric Physical Therapy (2001)*, 40(1), 1–36. <https://doi.org/10.1519/JPT.0000000000000099>
- Mather, M., Scommenga, P., & Kilduff, L. (2019). *Fact sheet: Aging in the United States*. Retrieved from <https://www.prb.org/aging-unitedstates-fact-sheet/>
- Miller, H. (2015). Dehydration in the older adult. *Journal of Gerontological Nursing*, 41, 8–13. <https://doi.org/10.3928/00989134-20150814-02>
- Min, Y., Nadpara, P. A., & Slattum, P. W. (2016). The association between sleep problems, sleep medication use, and falls in community-dwelling older adults: Results from the health and retirement study 2010. *Journal of Aging Research*, 2016, 3685789. <https://doi.org/10.1155/2016/3685789>
- Mitchell, B., Keating, N., de Jong Gierveld, J., Gotzmeister, D., Zecevic, A. A., Klinger, L., & Salmoni, A. (2015). “People are getting lost a little bit”: Systemic factors that contribute to falls in community-dwelling octogenarians. *Canadian Journal on Aging*, 34(3), 397–410. <https://doi-org.ezproxylr.med.und.edu/10.1017/S071498081500015X>
- Russell, K., Taing, D., & Roy, J. (2017). Measurement of fall prevention awareness and behaviours among older adults at home. *Canadian Journal on Aging / La Revue Canadienne Du Vieillissement*, 36(4), 522–535. <https://doi.org/10.1017/S0714980817000332>
- Sheffield, C. Smith, C. A., & Becker, M. (2013). Evaluation of an agency-based occupational therapy intervention to facilitate aging in place. *The Gerontologist*, 53(6), 907–918. <http://dx.doi.org.ezproxylr.med.und.edu/10.1093/geront/gns145>
- Streicher, M., Zwienen-Pot, J., Bardon, L., Nagel, G., Teh, R., Meisinger, C., . . . O’Connor, E. M. (2018). Determinants of incident malnutrition in community-dwelling older adults: A MaNuEL



- multicohort meta-analysis. *Journal of the American Geriatrics Society*, 66(12), 2335–2343. <https://doi.org/10.1111/jgs.15553>
- Trevisan, C., Crippa, A., Ek, S., Welmer, A.-K., Sergi, G., Maggi, S., . . . Rizzuto, D. (2019). Nutritional status, body mass index, and the risk of falls in community-dwelling older adults: A systematic review and meta-analysis. *Journal of the American Medical Directors Association*, 20(5), 569-582.e7. <https://doi.org/10.1016/j.jamda.2018.10.027>
- Ullevig, S. L., Sosa, E. T., Crixell, S., Uc, E., Greenwald, B., Marceaux, S., & Friedman, B. J. (2018). Home-delivered meals and nutrition status among older adults in central Texas. *Journal of Nutritional Health Aging*, 22(7), 861-868. <http://dx.doi.org/10.1007/s12603-018-1038-0>
- Walton, K., Rosario, V. A., Pettinghill, H., Cassimatis, E., & Charlton, K. (2020). The impact of home-delivered meal services on the nutritional intake of community living older adults: A systematic literature review. *Journal of Human Nutrition and Dietetics*, 33(1), 38-47. <http://dx.doi.org.ezproxylr.med.und.edu/10.1111/jhn.12690>
- Whitelock, E., & Ensaff, H. (2018). Own your own: Older adults' food choice and dietary habits. *Nutrients*, 10(4), 413-430. <https://doi.org/10.3390/nu10040413>
- Wiles, J. L., Leibing, A., Guberman, N., Reeve, J., & Allen, R. E. S. (2012). The meaning of “aging in place” to older people. *The Gerontologist*, 52(3), 357–366. <https://doi.org/10.1093/geront/gnr098>

