

The Neighborhood Environment: Perceived Fall Risk, Resources, and Strategies for Fall Prevention

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Purpose of the Study: To explore the experience of older adults in their neighborhood in relation to perceived fall risk, fear of falling (FOF), and resources/strategies for fall prevention.

Design and Methods: Fourteen older adults, 65 years of age and older from 3 urban senior centers, participated in this qualitative study. The semistructured interview guidelines and background questionnaire were developed by the researchers based on the literature and an existing measure of walkability. Both tools were refined based on pilot interviews with seniors. Colaizzi's phenomenological method was used for data analysis.

Results: Five themes emerged from the data: (a) The built environment contributes to perceived fall risk and FOF, (b) personal strategies used to adapt to perceived neighborhood fall risks-behavioral approaches, (c) resources for physical activity and safety, (d) barriers to physical activity and exercise, and (e) neighborhood features as a motivator.

Implications: Urban-dwelling seniors perceive that neighborhood features contribute to or mitigate fall risk and FOF. Behavioral strategies are used by seniors to prevent outdoor falls. The findings can help clinicians develop targeted fall prevention interventions for well elders and help urban planners to design and retrofit urban environments to reduce fall risk.

Key words: Built environment, Social environment, Older adults, Perceptions of fall risk, Fear of falling, Fall prevention

Approximately 30% of elders fall each year. Falls can cause soft tissue trauma, head injury, and fractures, resulting in decreased independence in daily living skills, increased risk of nursing home placement, and high health care costs ([Center for Disease Control, 2013](#)). Although more than half of all falls occur outdoors, the focus of fall prevention has been

on intrinsic/individual factors and the home environment. Therefore, the neighborhood environment, its impact on perceived fall risk as well as fear of falling (FOF), and the resources that the neighborhood affords for fall prevention warrants further study. To address this gap, this study focused on the experience of older adults in their neighborhoods.

Risk Factors for Falls

The home environment presents safety hazards that can increase risk of falls for elders with vision loss and for those with a history of falls (Gillespie et al., 2012; Letts et al., 2010). In addition to the home environment, a number of intrinsic/individual factors, such as FOF and depression, have been linked to fall risk (Delbaere et al., 2010; Kao, Wang, Tzeng, Liang, & Lin, 2012). Outdoor falls are almost as common as indoor falls among community-dwelling seniors (Li et al., 2006). Risk factors for outdoor versus indoor falls can be differentiated based on functional status, health, age, and gender. While predictors of indoor falls include illness, physical disability, deficits in activities of daily living (ADLs), medication use, and low fall efficacy scale scores, outdoor falls are more often associated with white race, depression, moderate-to-high alcohol consumption, higher education levels, being male, and of a younger age. (Kelsey et al., 2010; Li et al., 2006). Healthy, active seniors have a higher risk for outdoor falls while walking and participating in vigorous activity. However, limiting time spent outdoors can also increase fall risk (Sooudi, 2009). Outdoor falls during vigorous activity were found to be most problematic among individuals with a fast gait speed (Kelsey, Procter-Gray, Hannan, & Li, 2012). It is noteworthy that outdoor falls are more likely to be precipitated by environmental causes as compared to indoor falls (Li et al., 2006) and frequently occur while walking in a familiar area (Nyman, Ballinger, Phillips, & Newton, 2013).

FOF contributes to fall risk, particularly among seniors who have a resultant restriction in activity level (Bertera & Bertera, 2008; Friedman, Munoz, West, Rubin, & Fried, 2002). A number of predictors of FOF have been identified. In a study of community-dwelling seniors in Canada, female gender, and living in a small city or rural area were demonstrated to be risk factors whereas living with a spouse or partner was demonstrated to be a protective factor (Filliatrault, Desrosier, & Trottier, 2009). In a prospective study of urban-dwelling seniors in New York, incident FOF was predicted by female gender, but also by gait disorder, previous falls, and the presence of depressive symptoms (Oh-Park, Xue, Holtzer, & Verghese, 2011). Additional predictors of FOF include ADL performance (Shin et al., 2010) and age (Scheffer, Schuurmans, van Dijk, van der Hooft, & de Rooij, 2008). The neighborhood environment may also contribute to FOF, given that anxiety about falling again is a common emotional response among seniors who have fallen outdoors (Nyman et al., 2013).

Senior's Perceptions of Fall Risks

Elder's perspectives have also been explored regarding fall risk. Although falling is recognized by elders as an important, preventable health problem, fall risk is not viewed as

personally relevant for many seniors (Braun, 1998; Hughes et al., 2008; Yardley et al., 2006). According to survey research, community-dwelling seniors do not consider individual factors such as gender, education, functional mobility, and fall history to be fall-related risk factors, however, outdoor environmental features, including pavement conditions and handrails, are perceived as likely causes of falls (Braun, 1998). Among seniors who have experienced a fall, fall risk has been attributed to individual factors and behaviors (e.g., health condition, aging, shoes, rushing, or not paying attention) and the environment (e.g., uneven/poorly maintained sidewalks, weather/slippery conditions, dogs pulling or running into them) (Nyman et al., 2013; Roe et al., 2008).

Fall Prevention and Physical Activity

Although fall risk and perceived risk of falls have been attributed to a number of factors among elders, protective factors for fall prevention are also known. In their systematic review of exercise programs for fall prevention among community-dwelling older adults, Arnold, Sran, and Harrison (2008) found that exercise programs, whether delivered in a group, individual, or combined format, reduced both the number of falls and risk for falling. When multifactorial programs (individualized assessment and treatment programs that include multiple approaches) were compared to interventions that used exercise alone, purely exercise-based interventions were found to be more effective in reducing rate of falling (Petridou, Manti, Ntinapogias, Negri, & Szczerbinska, 2009).

Characteristics and type of exercise have a significant impact on the effectiveness of fall prevention interventions. In a recent Cochrane review (Gillespie et al., 2012), programs that included multiple categories of exercise (e.g., strength training, flexibility training, cardiopulmonary, and balance training) were shown to be effective with regard to both fall risk and rate of falls. Tai chi, which incorporates both stretching and balance training, was also noted to be effective in reducing risk of falls, but less effective for individuals who were at high risk of falling. Given the importance of multiple categories of exercise in preventing falls, walking alone does not appear to be an effective fall prevention intervention (Chippendale & Bear-Lehman, 2011). However, the neighborhood environment affords opportunities for both walking and formal exercise through access to community-based programs and facilities.

Neighborhood Environment and Physical Activity

Walking for leisure and to complete errands has been identified as one of the most common forms of physical activity

among elders (Dawson, Hillsdon, Boller, & Foster, 2007). The neighborhood environment also provides resources for exercise and activity programs (e.g., senior centers, community pools, gyms, volunteer programs). Accordingly, a number of studies have established a link between the neighborhood environment and physical activity levels among elders. King and colleagues (2011) investigated the relationships between physical activity, neighborhood walkability (i.e., opportunities to engage safely in active transport), and income among seniors from census blocks in two regions in the United States using surveys and data from accelerometers. There was a significant main effect for walkability, as a higher average number of self-reported minutes per week of walking for errands were reported by participants in higher walkable neighborhood quadrants as compared to lower walkable neighborhood quadrants. Those quadrants with higher walkability and/or income level were linked with a greater likelihood of meeting national recommendations for moderate-to-vigorous physical activity. In a subsequent report, Adams and colleagues (2012) examined both walkability and the availability of recreational features in the neighborhood. Among older adults aged 66–97, participants in highly walkable or recreationally dense profile groups had between 7.3 and 9.8 more minutes per day of measured moderate-to-vigorous physical activity as compared to those in low walkability, transit, and recreational profile groups.

Not all neighborhoods are equal in terms of opportunities for physical activity. Using a self-administered survey of participants in national walking programs in the United Kingdom, Dawson and colleagues (2007) found that among senior participants, number of barriers to walking in the neighborhood was significantly associated with the deprivation index, calculated as a weighted area-level aggregate of income and employment, education and skills, barriers to housing and services, and crime. Participants who cited at least one environmental barrier to walking exhibited significantly fewer metabolic equivalent hours/week of leisure walking in the preceding week than those who cited none.

Studies have also focused on the characteristics of the physical environment that promote or discourage physical activity in the neighborhood. Using a random sample of adults, aged 55 and older from four neighborhoods representing low and high walkability, Strath, Isaacs, and Greenwald (2007) examined environmental supports and barriers to physical activity. Survey data and semistructured interview results revealed the following themes related to environmental barriers: infrastructure (e.g., traffic safety and poorly maintained sidewalks), land use (e.g., lack of convenient destinations), and personal safety (from crime and harassment).

Researchers have also studied characteristics of the built environment that promote and discourage physical activity

for individuals with mobility disabilities (i.e., for people who use a walker, cane, or wheelchair). Using data collected from participant-worn Global Positioning Devices as a guide, Rosenberg, Huang, Simonovich, & Belza (2013) conducted semistructured interviews with adults and older adults in Kings County, Washington. Themes that emerged as barriers and facilitators included curb ramps, parking (e.g., distance from desired destination), aesthetics, lighting, weather, street crossings (availability of marked crossings and timing of walk signals), sidewalks, traffic (speed, visibility to drivers), and amenities (sheltered places to walk and benches).

Physical features of the neighborhood, however, are not solely responsible for physical activity patterns. Social support and perceptions of the social environment also impact physical activity levels. Using a mixed methods design incorporating surveys and semistructured interviews, Annear, Cushman, and Gidlow (2009) examined leisure physical activity among elders living in Christchurch, New Zealand. Qualitative results revealed that common characteristics, such as having an activity partner, influence increased participation in leisure physical activity. Using photovoice documentation, Mahmood and colleagues (2012) examined themes related to the social and physical aspects of the environment that influence physical activity among seniors living in Vancouver, Canada and Portland, OR. In addition to themes that relate to the physical environment, such as diversity of destinations and presence of community-based programs, themes related to the social environment and its promotion of physical activity also emerged such as the availability of peer support and feeling safe and secure.

Although researchers have explored the link between the neighborhood environment and physical activity, and differentiated fall risk factors for indoor versus outdoor falls, few studies have explored the experience of older adults in their neighborhood in relation to perceived fall risk and resources for fall prevention. Strategies used by seniors to prevent outdoors falls have yet to be explored. The purpose of this study is to explore the experience of older adults in their neighborhood in relation to perceived fall risks, FOF, as well as resources and strategies for fall prevention.

Methods

Design

In this qualitative study, we used a background questionnaire to ascertain participant demographics and other pertinent information, followed by in-depth semistructured interviews. Collaizzi's (1978) phenomenological analysis method was used for analysis. Two coders were employed to increase reliability and member checking was used to increase validity of the analysis.

Participants

A convenience sample of English-speaking, community-dwelling elders, aged 65 years and older, were recruited from three New York City senior centers in lower Manhattan. A total of 14 participants were recruited using flyers and by making announcements before regularly scheduled activity programs. The study was approved by the New York University Committee on Activities Involving Human Subjects (IRB).

Procedures

Following informed consent, participants completed the background questionnaire, which was administered orally by the principal investigator (PI). The background questionnaire and semistructured interview guide were developed by the PI and coinvestigator based on the literature and the SWEAT-R, an existing measure of walkability (Michael et al., 2009). Both tools were piloted with five community-dwelling seniors and modified based on interviewer feedback. Questionnaires and interviews were conducted behind a closed door in a conference room at the university or in an office at the senior center.

Given that gender, age, ethnicity, time spent outdoors, and depressive symptoms have all been linked to outdoor fall risk (Kelsey et al., 2010; Li et al., 2006), each of these variables were included in the background questionnaire. Participants were asked how long they had lived in their current place of residence since walking in a familiar environment is associated with outdoor falls (Nyman et al., 2013). Also included were ADL status and whether participants lived alone or with family/friends, since both have been associated with FOF (Filliatraut et al., 2009; Shin et al., 2010). Mobility disability, another predictor of FOF (Oh-Park et al., 2011), was assessed using two questions, one pertaining to use of a mobility device and the other related to use of public transit (as opposed to the need for Paratransit, a special transport service for people with disabilities, that typically employs a flexible route and the use of a wheelchair lift).

The background questionnaire was followed by an audio-recorded in-depth semistructured interview also conducted by the PI. Interviews began by asking participants to describe their neighborhood and the activities they participate in each week. This was followed by questions pertaining to resources for physical activity and exercise, an established component of fall prevention, as well as questions related to perceived fall risks, resources for fall prevention, and strategies used to prevent falls. Questions regarding neighborhood features that discourage or encourage walking or physical activity were followed up with probes based on the SWEAT-R, a walkability measure.

For example, participants were asked about presence of benches and sidewalk conditions. Given that the social environment also plays a role in physical activity participation and fall prevention (Annear et al., 2009), a question regarding available social supports to encourage physical activity was included. Probes regarding perceived neighborhood fall risks were drawn from previous studies that pertained to outdoor falls and included questions about railings on stairs, uneven sidewalks, snow, and ice, etc. (Li et al., 2006). We collected data on risk factors most commonly associated with outdoor fall risk. Strategies used by senior's to help prevent outdoor falls have not been the focus of previous studies and thus warranted further exploration in this study. Interviews ranged from 30 min to 1 hr and were transcribed verbatim by the PI and a research assistant.

Data Analysis

SPSS version 21 was used for descriptive analysis of participant characteristics. Collaizzi's (1978) phenomenological analysis method was used for qualitative analysis. Two researchers, the PI and the coinvestigator each independently, coded the data. This involved a process whereby each investigator read through all the transcriptions to get a feeling for them. This was followed by the extraction of significant statements that directly pertained to the research question, that is, the experience of older adults in their neighborhood in relation to perceived fall risk and resources/strategies for prevention. Meaning was assigned to each significant statement. Discussion until consensus occurred between the two coders with regard to identification of significant statements and their assigned meanings. Each coder individually grouped formulated meanings into corresponding themes and then discussed their decisions jointly until consensus. Themes were related back to the original transcriptions to make sure no significant statement were unaccounted for. In a final step, 6 of the 14 participants were contacted to give feedback on the final themes via member checking. All six participants reported that the findings were consistent with their experiences in the neighborhood.

Results

Demographic characteristics of the study participants ($N = 14$) include a mean age of $M (SD) = 75.86 (7.62)$. Although the majority of participants were Caucasian ($n = 10$; 71.4%), there were also black ($n = 2$; 14.3%) and Hispanic ($n = 2$; 14.3%) participants. Mean length of residence in current apartment was $M (SD) = 36.50 (14.81)$ years. All participants used public transit with the majority

using both bus and subway ($n = 10$; 71.4%) as opposed to the bus alone. None of the participants relied on Paratransit as their sole means of transportation. The majority of participants identified walking as their primary source of physical activity ($n = 12$; 85.7%) and required no assistance for ADLs ($n = 11$; 78.6%). Only 3 out of the 14 participants used a mobility device (walker or cane) and only one participant reported frequently feeling sad or blue, indicating the possibility of depression. Time spent outdoors per day in the summer ranged from less than 1 to 3 hr and in the winter from less than 30 min to 2 hr.

A total of 452 significant statements were extracted and the following five themes emerged from the data: (a) The built environment contributes to fall risk and FOF, (b) personal strategies used to adapt to neighborhood fall risks-behavioral approaches, (c) resources for physical activity and safety, (d) barriers to physical activity and exercise, and (e) neighborhood features as a motivator.

The Built Environment Contributes to Perceived Fall Risk and FOF

Participants described several structural factors impacting fall risk in the neighborhood. Uneven walking surfaces on sidewalks including uneven grates, brick surfaces, and embedded decorative stones present challenges. Curbs were described as particularly problematic, including those that were sloped and/or covered with metal. Other factors were related to inadequate maintenance and included uneven or cracked streets and sidewalks, potholes, pools of rainwater, and inadequate or delayed clearance of snow and ice from sidewalks and streets (including manholes.) Cluttered sidewalks and steps were identified as increasing perceived fall risk. Street design, construction, and associated traffic patterns also increased perceived fall risk, as one participant described, "The traffic is coming from 4 or 5 directions. It is not clear." Another described, "I am extremely nervousI can't figure where is the safest way to cross."

Participants also explained how poorly lit areas pose a fall risk. One participant stated, "in stores.....and in the subway because when you don't see so well when you go down the stairs even when they have it marked, you are still not sure if it is the last step or not." They also described inadequate visibility of cyclists ("...you don't expect a bike to come between two cars.") and motorized children's toys on the sidewalks as contributing to fall risk.

In addition to weather-related influences, such as snow, ice, and wind, structural factors such as wet subway floors, open grates, and tiled walkways contributed to FOF. The presence of cyclists and skateboarders also pose threats that increase fear. One participant described, "There are the delivery people too and often they have a little old bike, no

light, on the sidewalk. You have to be even careful on the sidewalk." Another reported, "I am more worried about a bicycle than a car..... They don't stop the way cars stop."

Personal Strategies Used to Adapt to Perceived Neighborhood Fall Risks: Behavioral Approaches

Participants employed a wide variety of behavioral strategies to manage fall risks in the neighborhood, including potential falls resulting from pedestrian-vehicular accidents. At traffic lights, participants reported pausing after the light had turned green, looking both ways twice, making eye contact with drivers, and waiting until no cars were turning left. Some participants reported raising their hand to stop traffic if they did not make it across the street before the light changed. Given that bicycles were of concern to many participants, waiting for the next light if cyclists ran the light was another strategy used.

Several participants changed their gait, including slowing down, being attentive to picking up their feet, and in snowy and icy conditions, using a wide gait and walking with a flat foot. One participant stated "after I had that incident I would say to myself, lift your feet when I walk. Lift your feet because you know how we tend to shuffle sometimes, and I think seniors too, they get lazy you know. Lift your feet, lift your feet, lift your feet because I did not want this to happen again." Choosing appropriate footwear, such as walking shoes or boots in the winter, was reported as helpful by many participants. Participants walked around grates and uneven sidewalks and avoided certain streets all together, particularly those with cobble stones, large puddles, multiple sources of traffic, or where pedestrian accidents were reported in the media. For example, one senior reported "It's the city you know, you can't do anything about it you just maneuver around it, or you just avoid particular streets if you can." Some seniors also planned their route to include streets where benches were available.

Some participants capitalized on the social environment to increase safety. One senior reported asking other pedestrians if she could hold their arm while crossing a snowy or icy street. Another crossed with groups of young people. One woman reported using a cane to alert other pedestrians to her mobility limitations. Reporting pain and "looking mournful" was effective in having other pedestrians give up their seat at bus shelters.

Using caution was manifested by participants in many different ways including looking down and looking ahead, using an assistive device, holding rails on stairs when available, and avoiding texting or using a cell phone while walking. Decreasing the amount of items carried or making multiple trips for shopping was also commonly reported.

One woman stated “I will make two trips instead of one, instead of carrying too many things I can’t manage. I will even pay for something and come back”. Some reported taking more of a self-advocacy approach by calling the city to report a problem with street conditions or calling the superintendent of their building to ensure snow removal.

In some cases, seniors avoided going outdoors all together, especially if they were not feeling well, or during severe weather conditions. Another strategy used was to return home if needed. One woman stated “Sometimes you feel fine when you are home then you get outside and you get on the sidewalk and start walking and you realize I felt fine at home but I am not exactly myself and so I go back home.”

Resources for Physical Activity and the Promotion of Safety

Participants identified a broad spectrum of resources available in the neighborhood for physical activity and for the promotion of safety. Resources described included those in the social environment, the built environment as well as services and programs available. Resources in the built environment to promote physical activity included walking trails and bike paths along the river with numerous benches available for resting and the availability of stores for browsing and shopping. Participants mentioned street fairs and farmers markets as valuable resources for encouraging walking. One man stated “when they have street fairs, it is always good, makes you want to walk up and down ten or 12 blocks just for the heck of it”. For those who enjoyed longer walks, the availability of public transit as an alternative form of mobility when they became tired was key. Unreliable public transit encouraged increased physical activity for some seniors. One woman stated, “so if you go there and you wait for the bus and it’s never coming then you say it’s a nice day, let me walk.”

Built structures used as a resource to increase safety included rails on stairs, fences to hold for support, benches, kneeling buses, elevators in the subway, and timed traffic lights indicating the amount of time remaining to cross. One man stated, “Now they are putting these timers... it tells you how many seconds you have to get across, that’s a good idea”. Telephone poles and other structures near the sidewalk proved to be an important resource to assist a person who fell to pull up into standing.

The social environment was also described as an important resource for the promotion of physical activity. Many described an increased perception of safety corresponding to the presence of other people. One woman stated, “I don’t have any problem because I live in the neighborhood. I feel it is always busy, and the trains are crowded because at that

time a lot of people travel by the train going home, or sometimes I have a neighbor that goes also, so we go together.” Being a caregiver for a friend or family member resulted in increased physical activity for some participants. Although some seniors reported that their social circle impacted their physical activity participation and willingness to try new classes and facilities, there were also self-professed “loners” that initiated their own physical activity and exercise routines irrespective of others.

The social environment also promoted increased safety. For example, drivers were reported to wave to pedestrians to cross the street, and crossing guards and city workers increased safety for crossing streets and navigating construction areas. Other pedestrians were reported to hold doors when carrying heavy packages and one restaurant owner was reported to regularly provide a chair outside for one senior to rest. A number of participants had experienced outdoor falls and identified resources in the social environment that were invaluable post fall. These included other pedestrians to help get up and to check in with them once they were able to stand and walk. One woman described the scenario, “I wasn’t injured and people were over there. I open my eyes and people said, “Do you wanna go to the hospital?” “Did you have your breakfast?” The people were very kind, and one man actually followed me to see that I was alright.”

Senior centers were identified as a readily available program/service and an important resource for physical activity. For some, this included walking to and from the center daily as well as participating in exercise classes once there. One participant stated, “I think the centers have the biggest draw, you know for you to go, you can eat there if you wish, you can exercise, there is yoga, like I said, there is tai chi.” Going to and from cultural events, libraries, classes at local universities, and work promoted physical activity for many participants. Gyms, in particular those with adapted exercise equipment and classes, were utilized by some participants as were university athletic facilities. Low and no cost facilities, programs, and public transit were identified as important resources. One woman stated the following in reference to a neighborhood gym, “Well, they have a reduced fee for a certain time for seniors when other people are at work so it’s not that exorbitant fee.” Neighborhood services noted to promote safety included hospital-based fall prevention programs and delivery services for groceries and prescription medications, which were used in inclement weather.

Barriers to Physical Activity and Exercise

Although the neighborhood environment affords resources for physical activity and exercise, barriers to physical

activity were also reported in the built and social environment as well as in available programs and services. Reported built barriers were: cobble stones, broken sidewalks, scaffolding, lack of midblock crossings, and steps (e.g., subway access). Wind, snow, and ice in the natural environment were noted to be barriers for many participants. One woman who used a cane for mobility stated, "Well last Monday I did not come out because it was too windy, and I am afraid. It was awful, but otherwise I try". Lack of snow removal and accumulation of slush at street corners were reported by some participants as barriers for physical activity.

For program/service specific barriers, participants reported lack of programmatic accommodations for lower fitness levels at some gyms and exercise facilities. One male participant described the classes at his local gym "these guys are really good...the level, even the lowest level I am looking at and saying, I am not going to go in and embarrass myself". Further, there was a perception among some seniors that gyms were for men and young people. Distance to exercise facilities and schedule and timing of classes were reported as problematic by some. Difficulty securing a taxi at night was also mentioned.

With regard to barriers in the social environment, the presence of other pedestrians, including, dog walkers, created a barrier for walking as did the gait speed of others on the sidewalk. One woman stated, "what I have learned is to stop rushing ...at first it was very hard to be slow because everybody is passing you by." Although benches in parks were reported as a valuable resource, access was limited at times due to occupancy by others as well as designated parks for children and their guardians. Rules regarding access to these parks were reinforced. One gentleman stated, "One time I went in there to sit and wait for a bus, a woman came over to me, an older woman, and she said 'sir, you better not sit in here' I said, 'why?' ...'don't you read the sign outside? It's only for children'." Although railings were reported to be present in most locations where there are steps, other pedestrians were noted to block access to the railings. Fear for personal safety was commonly reported as a barrier to physical activity at night. Some seniors felt particularly vulnerable because of looking older. One woman stated, "Having grey hair and being elderly, you have to be realistic, you are a sitting duck and there are times when I don't feel that it is safe".

Neighborhood Features as a Motivator

According to participants, certain aspects of the neighborhood encourage physical activity. Aesthetic features including appealing architecture, well maintained green spaces, ("beautiful plants....draw you outside") water views, and

settings that promote connectivity to nature promote outdoor walking and exercise. Structural features, such as continuous and spacious walking paths and benches (to allow "stopping to rest"), support physical activity in these areas.

Opportunities for socialization motivate older adults to leave their homes and be engaged in activity. Social contact with other people, including strangers, encouraged a number of seniors to walk outdoors, as did the opportunity to socialize with friends. Some places that promote socialization are neighborhood basketball courts and playgrounds that promote conversation and "people watching." Dog parks were cited as a place older adults are often drawn to walk their own dogs or enjoy others' company. The food (availability and quality) at senior centers as well as the diversity of activity times and offerings also serve as motivators. Some participants visit more than one center in a day. As one participant described, "I usually go to senior center for exercise and breakfast" and then may "go to another one for exercises because not all have the same kind of activities, so whichever one suits my needs."

Discussion

In this study, we used qualitative methods to explore the experience of older adults in their neighborhoods in relation to perceived fall risks and resources for fall prevention. This study fills an evidence gap and is an important area of inquiry, given the growing older adult population and the detrimental consequences of falls among elders. Results reveal that the neighborhood affords both supports and barriers for physical activity and fall prevention, and that features of the neighborhood can motivate seniors to be more physically active. The neighborhood presents fall risks and contributes to the FOF for some seniors. However, a variety of personal strategies are used by seniors to increase safety and navigate the perceived fall risks in their neighborhood.

The results are consistent with past findings regarding outdoor walking as a primary source of physical activity among older adults (Dawson et al., 2007). Also consistent with past studies are some of the identified barriers and resources for physical activity including land use (e.g., availability of destinations), infrastructure (e.g., traffic), personal safety, weather, esthetics, sidewalk conditions, and availability of an exercise partner (Anneer et al., 2009; Rosenberg et al., 2013; Strath et al., 2007). There are a number of additional barriers revealed in this study including: difficulty securing a taxi at night, level of exercise classes at local gyms, speed of other pedestrians, and access to existing benches to name a few. Additional resources for the promotion of physical activity reported in this study include farmers markets and street fairs (a specific

manifestation of land use) and public transit as an alternate to walking when fatigued.

Consistent with past findings, peer support can promote increased physical activity for seniors (Mahmood et al., 2012). However, according to this study, there are “loners” whose physical activity routines are not influenced by others. These findings suggest that there is not a one size fits all approach to increasing physical activity among elders. For example, peer mentors may motivate some to engage in physical activity but not all seniors.

This study contributes new knowledge regarding the built and social environment and its contribution to perceived fall risk, as well as the resources it provides for fall prevention and recovery post-fall. A variety of perceived fall risks in the built environment were identified by participants that warrant the attention of urban planners and city workers including sidewalk and street surfaces and accessibility. The ongoing maintenance of walking areas and prompt response to weather-related hazards also warrants close attention by city officials.

Fences and poles near sidewalks, designed for other uses, serve the dual purpose of physical supports to promote safety and to pull into standing status post-fall. Additionally, crossing guards, identified as a resource for safety, are often considered a resource for school children. However, given the growing older adult population, they may be an important safety mechanism in neighborhoods with large concentrations of seniors going forward. Delivery services at local stores and pharmacies were noted to be a valuable resource, especially in inclement weather. Consequently, these service options may need to be expanded as the older adult population continues to grow.

The study provides a rich description of the plethora of personal strategies used by elders to navigate perceived fall risks in the neighborhood. These strategies may serve as a valuable resource for designing effective programs for the prevention of outdoor falls. Surprisingly, the participants did not discuss involvement with rehabilitation therapists who may be involved in community-based wellness programs that provide education and resources on fall prevention (Sloves & Fox, 2010). The access to such programs, as well as adoption and efficacy in diverse older populations, warrants future examination. Another application of findings includes the development of senior housing complexes in communities where there are motivators for physical activity for elders such as nature, presence of people/opportunities for socializing, space on sidewalks, water views, etc. According to the results of this study, gyms and other community-based exercise facilities may need to better market their services and modify their programs for seniors.

Strengths and Limitations

Limitations include the self-selection of seniors into the study. All participants live in Manhattan and regularly attend senior centers. This calls into question application of the results to other urban areas and to seniors who are nonparticipants in senior programs. In the future, the experience of elders who do not attend senior centers warrants exploration. Although participants are community-dwelling seniors who do not receive supportive services, elders were not screened for probable dementia therefore cognitive/memory impairments cannot be ruled out.

Conclusion

This study has provided new insights into the experience of older adults in their neighborhood in relation to perceived fall risks and resources/strategies for fall prevention. Although more research is needed to expand and clarify our findings with larger samples, the results provide a rich description of perceived fall risks and strategies used by seniors in their neighborhood to prevent falls. Resources and barriers to physical activity and exercise stemming from the built and social environment and available services and facilities are also described. Application of findings include the need for structural changes and repairs, considerations regarding the design/location of senior living communities, strategies that may be helpful in designing or refining outdoor fall prevention programs, as well as identification of needed changes in marketing strategies and design of exercise programs in local fitness centers to meet the needs of the growing older adult population.

References

- Adams, M. A., Sallis, J. F., Conway, T. L., Frank, L. D., Saelens, B. E., Kerr, J., ... King, A. C. (2012). Neighborhood environment profiles for physical activity among older adults. *American Journal of Health Behavior*, 36, 757–769. doi:10.1016/j.ypmed.2011.02.020
- Annear, M. J., Cushman, G., & Gidlow, B. (2009). Leisure time physical activity differences among older adults from diverse socioeconomic neighborhoods. *Health and Place*, 15, 482–490. doi:10.1016/j.healthplace.2008.09.005
- Arnold, C. M., Sran, M. M., & Harrison, E. L. (2008). Exercise for fall risk reduction in community-dwelling older adults: A systematic review. *Physiotherapy Canada*, 60, 358–372. doi:10.3138/physio.60.4.358
- Bertera, E. M., & Bertera, R. L. (2008). Fear of falling and activity avoidance in a national sample of older adults in the United States. *Health and Social Work*, 33, 54–62.
- Braun, B. L. (1998). Knowledge and perception of fall-related risk factors and fall-reduction techniques among community-dwelling elderly individuals. *Physical Therapy*, 78, 1262–1276.
- Center for Disease Control. (2013). Preventing falls among older adults. Retrieved from <http://www.cdc.gov/Features/OlderAmericans/>

- Chippendale, T., & Bear-Lehman, J. (2011). The issue is: Falls, older adults, and the impact of the neighborhood environment. *American Journal of Occupational Therapy*, 65, e95–100. doi:10.5014/ajot.2011.000729
- Colaizzi, P. F. (1978). Psychological research as the phenomenologist views it (p 48–71). In R.S. Valle & M. King (Eds) *Existential Phenomenological Alternatives for Psychology*. New York: Oxford.
- Dawson, J., Hillsdon, M., Boller, I., & Foster, C. (2007). Perceived barriers to walking in the neighborhood environment: A survey of middle-aged and older adults. *Journal of Aging and Physical Activity*, 15, 318–335.
- Delbaere, K., Close, J. C., Heim, J., Sachdev, P. S., Brodaty, H., Slavbin, M. J., ... Lord, S. R. (2010). A multifactorial approach to understanding fall risk in older people. *Journal of the American Geriatrics Society*, 58, 1679–1685. doi:10.1111/j.1532-5415.2010.03017
- Filliatraut, J., Desrosier, J., & Trottier, L. (2009). An exploratory study of individual and environmental correlates of fear of falling among community-dwelling seniors. *Journal of Aging and Health*, 21, 881–894. doi:10.1177/0898264309340694
- Friedman, S. M., Munoz, B., West, S. K., Rubin, G. S., & Fried, L. P. (2002). Falls and fear of falling: Which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *Journal of the American Geriatrics Society*, 50, 1329–1335.
- Gillespie, L. D., Robertson, M. C., Gillespie, W. J., Sherrington, C., Gates, S., Clemson, L. M. & Lamb, S. E. (2012). Interventions for preventing falls in older people living in the community. *Cochrane Database of Systematic Reviews*, 9, Art. No.: CD007146. doi:10.1002/14651858.CD007146.pub3
- Hughes, K., van Beurden, E., Eakin, E. G., Barnett, L. M., Patterson, E., Blackhouse, J., ... Newman, B. (2008). Older persons' perception of risk of falling: Implications for fall-prevention campaigns. *American Journal of Public Health*, 98, 351–357. doi:10.2105/AJPH.2007.115055
- Kao, S., Wang, Y. C., Tzeng, Y. M., Liang, C. K., & Lin, F. G. (2012). Interactive effect between depression and chronic medical conditions on fall risk in community-dwelling elders. *International Psychogeriatrics*, 24, 1409–1418. doi:10.1017/S1041610212000646
- Kelsey, J. L., Berry, S. D., Procter-Gray, E., Quach, L., Nguyen, U. S., Li, W., ... Hannan, M. T. (2010). Indoor and outdoor falls in older adults are different: The maintenance of balance, independent living, intellect, and Zest in the Elderly of Boston Study. *Journal of the American Geriatrics Society*, 58, 2135–2141. doi:10.2105/AJPH.2012.300677
- 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, 2149–2156.
- King, A. C., Sallis, J. F., Frank, L. D., Saelens, B. E., Cain, K., Conway, T. L., ... Kerr, J. (2011). Aging in neighborhoods differing in walkability and income: Associations with physical activity and obesity in older adults. *Social Science and Medicine*, 73, 1525–1533. doi:10.1016/j.socscimed.2011.08.032
- Letts, L., Moreland, J., Richardson, J., Coman, L., Edwards, M., Ginis, K. M., ... Wishart, L. (2010). The physical environment as a fall risk factor in older adults: Systematic review and meta-analysis of cross-sectional and cohort studies. *Australian Occupational Therapy Journal*, 57, 51–64. doi:10.1111/j.1440-1630.2009.00787.x
- Li, W., Keegan, T. H., Sternfeld, B., Sidney, S., Quesenberry, C. P. Jr, & Kelsey, J. L. (2006). Outdoor falls among middle-aged and older adults: A neglected public health problem. *American Journal of Public Health*, 96, 1192–1200.
- Mahmood, A., Chaudhury, H., Michael, Y. L., Campo, M., Hay, K., & Sarte, A. (2012). A photovoice documentation of the role of neighborhood physical and social environments in older adults' physical activity in two metropolitan areas in North America. *Social Science and Medicine*, 74, 1180–1192. doi:10.1016/j.socscimed.2011.12.039
- Michael, Y. L., Keast, E. M., Chaudhury, H., Day, K., Mahmood, A., & Sarte, A. F. (2009). Revising the senior walking environmental assessment tool. *Preventive Medicine*, 48, 247–249. doi:10.1016/j.ypmed.2008.12.008
- Nyman, S. R., Ballinger, C., Phillips, J. E., & Newton, R. (2013). Characteristics of outdoor falls among older people: A qualitative study. *BMC Geriatrics*, 13, 125. Retrieved from <http://www.biomedcentral.com/content/pdf/1471-2318-13-125.pdf>
- Oh-Park, M., Xue, X., Holtzer, R., & Verghese, J. (2011). Transient versus persistent fear of falling in community-dwelling older adults: Incidence and risk factors. *Journal of the American Geriatrics Society*, 59, 1225–1231. doi:10.1111/j.1532-5415.2011.03475.x
- Petridou, E. T., Manti, E. G., Ntinapogias, A. G., Negri, E., & Szczerbinska, K. (2009). What works better for community-dwelling older people at risk to fall?: A meta-analysis of multifactorial versus physical exercise-alone interventions. *Journal of Aging and Health*, 21, 713–729. doi:10.1177/0898264309338298
- Roe, B., Howell, F., Riniotis, K., Beech, R., Crome, P., & Ong, B. N. (2008). Older people's experience of falls: Understanding, interpretation and autonomy. *Journal of Advanced Nursing*, 63, 586–596. doi:10.1111/j.1365-2648.2008.04735.x
- Rosenberg, D. E., Huang, D. L., Simonovich, S. D., & Belza, B. (2013). Outdoor built environment barriers and facilitators to activity among midlife and older adults with mobility disabilities. *The Gerontologist*, 53, 268–279. doi:10.1093/geront/gns119
- Scheffer, A. C., Schuurmans, M. J., van Dijk, N., van der Hooft, T., & de Rooij, S. E. (2008). Fear of falling: Measurement strategy, prevalence, risk factors and consequences among older persons. *Age and Ageing*, 37, 19–24. doi:10.1093/ageing/afm169
- Shin, K. R., Kang, Y., Kim, M. Y., Jung, D., Kim, J. S., Hong, C. M., ... Ma, R. W. (2010). Impact of depression and activities of daily living on the fear of falling in Korean community-dwelling elderly. *Nursing and Health Sciences*, 12, 493–498. doi:10.1111/j.1442-2018.2010.00567.x
- Sloves, G., & Fox, T. (2010). *Fox better living fall risk reduction and exercise program: An evidenced-based approach to reducing incidence of falls in assisted living facility residents*. Retrieved from <http://foxrehab.org/uploads/pdf/White%20Paper%20FRREP.pdf>
- Sooudi, K. K. (2009). The relationship between time spent outdoors, falls, and fall-risk among the community dwelling elderly in rural Japan. *Home Healthcare Nurse*, 27, 571–577. doi:10.1097/01.NHH.0000361930.29797
- Strath, S., Isaacs, R., & Greenwald, M. J. (2007). Operationalizing environmental indicators for physical activity in older adults. *Journal of Aging and Physical Activity*, 15, 412–424.
- Yardley, L., Bishop, F. L., Beyer, N., Hauer, K., Kempen, G. I., Piot-Ziegler, C., ... Holt, A. R. (2006). Older people's views of falls-prevention interventions in six European countries. *The Gerontologist*, 46, 650–660.