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ORIGINAL PAPER

Falls Experiences and Prevention Preferences of Adults in Mid-life

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Abstract
Falls prevention research and practice has focused primarily on older adults, yet healthy and productive aging does not begin at age 65. To help fill this gap in knowledge, the purpose of this study was to explore the falls experiences and prevention program preferences of adults in mid-life who had experienced falls or near falls. A qualitative study using content analysis was used. Multiple coders were employed to increase the reliability of the findings. Results revealed three major themes with regard to falls experiences including *precursors to falls, physical implications, and functional implications*. For prevention preferences, themes included *a continuum of interest, convenience is key, money matters, people you trust prompt action,* and *preventing future injury.* Study results reveal new insights regarding the falls experiences and prevention preferences of adults in mid-life and can serve as a starting point to inform prevention programs targeting this population.

Keywords Falls · Mid-life · Prevention programs

Falls have received significant attention in research and clinical practice. However, epidemiological and prevention studies have largely focused on older adults. There is a growing body of research to suggest that falls are also problematic among adults in mid-life [1, 2]. Further, in some studies, injurious falls have been shown to be most common among middle-aged women as compared to other sex-age groups [2]. Wages are highest among people at mid-life, therefore, in addition to the impact on function and quality of life, lost income is another noteworthy consequence of falls in middle-aged adults [3]. Healthy and productive aging does not begin at age 65, therefore, early intervention for falls risk warrants consideration.

Factors associated with increased risk for falls in middle-aged adults include female gender, low income, poor self-rated health, alcohol consumption, depression, and common chronic health conditions such as arthritis, diabetes, and cardiovascular disease [3, 4, 2]. Sarcopenic obesity has been associated with an increased risk of falls in middle-aged women [5]. Further, for women in mid-life, class II/III obesity is associated with a 23% increased risk of injurious falls after controlling for physical activity and chronic diseases [2]. Consistent with research on older adults, leisure time physical activity has been shown to have a protective effect in the prevention of non-injurious and injurious falls in mid-life adults [3].

Few studies have focused on the falls experiences of adults in mid-life, yet according to recent research, differences exist between age groups with regard to the cause and consequence of falls [6, 7]. Differences have been found in falls location between middle-aged and older adults (e.g. outdoors vs. indoors). There also appears to be differences in environmental cause (e.g. falls from a height, tripping over an object), and context (e.g. working, participating in leisure time physical activity, drinking alcohol) between age groups [6, 7]. In addition to differences in some risk factors and falls locations, there may be differences in the mechanism of the falls i.e. slipping versus tripping [7] and the types of injuries that can ensue. Although fractures and contusions are common falls—related injuries among both middle-aged and older adults, sprains and strains may be more common among people in mid-life [1].

Given the serious consequences of falls, effective falls prevention programs are needed across the lifespan. Some existing community-based programs for falls prevention

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have included adults younger than age 65 [8–10]. Examples are exercise based programs such as Otago [10] and multicomponent programs, such as Matter of Balance and Healthy Steps that incorporate education and exercise [8, 9]. However, community-based falls prevention programs are frequently offered at senior centers and senior housing sites [8, 11] which are rarely frequented by adults in mid-life. To our knowledge, with the exception of interventions designed for a specific workplace setting such as military personnel [12] or hospital employees [13], there are no existing programs that address the falls prevention needs of community-dwelling working-age adults. Given differences in employment status (i.e. working vs. retired), physical function, risk factors, and location of falls [12, 6, 2], existing falls prevention programs may be less than ideal for mid-life adults with regard to program content, mode and location of delivery. Consequently, both their reach and effectiveness are called into question.

Falls prevention, much like the prevention of chronic disease, calls for lifestyle and/or behavioral changes. Although prevention programs targeting falls in mid-life have yet to be developed, programs for other health conditions common in middle-aged adults, such as diabetes and heart disease, have been implemented successfully in a variety of locations and using a number of different modes of delivery. Examples of common locations for prevention programs include houses of worship [14], the workplace [15], community centers [16], YMCAs, [17] and primary care clinics [18]. Modes of delivery have included individual in-person or telephone sessions [19], group-based programs, [16, 14] training in a virtual environment, [20] phone apps, [21] and self-study using the internet or a DVD [22]. Program personnel have included healthcare professionals and trained lay leaders [22].

Intervention preferences for chronic disease prevention programs have also been studied. Research has revealed preference for intensive lifestyle interventions over medical management [23], and interest in mHealth apps among Smartphone users and those < 56 years of age [24]. Among some cultural groups, a preference for coaching and other human contact [25], and interest in working with community health workers has been noted [26]. Among low-income and disabled adults, qualitative research revealed a preference for programs with easy enrollment, helpful staff, convenience and flexibility, and proximate to reliable transportation [27]. Although a variety of program locations and delivery modes have been used successfully for chronic disease prevention programs, interest level and prevention program preferences for falls prevention is unknown among middle-aged adults and therefore warrants further study.

In summary, despite the growing evidence that injurious falls are problematic for adults in mid-life, few studies have focused on this population. In order to fill this gap and to inform the development of effective prevention programs, further study is warranted. The purpose of this study is to explore the falls experiences and prevention program preferences of adults in mid-life who have had falls or near falls in the last 2 years. We define falls as coming to rest on the ground or a lower level as a result of tripping, slipping, being pushed or struck. A near fall is defined as a stumble, slip, or trip, with the ability to rebalance oneself.

Methods

Design

In this qualitative study, a background questionnaire was used to ascertain participant demographics and other participant information. This was followed by in-depth semi-structured interviews. Conventional content analyses [28] was used for qualitative analysis, and multiple coders were employed to increase reliability of the findings.

Participants

A sample of ten participants were recruited through convenience and snowball sampling. The inclusion criteria were: community-dwelling adults, 50–64 years of age, able to ambulate independently, and have experienced falls or near falls in the last 2 years.

Measures

The background questionnaire and semi-structured interview guidelines were developed by the principal investigator based on information from the existing literature on falls among middle-aged adults [3, 29, 1, 2]. The background questionnaire consists of demographic and other questions including gender, age, body mass index (BMI), physical activity participation, and concern about falls, as these factors have been linked to falls risk [3, 2]. The semi-structured interview consisted of questions that prompted details of participants' falls experiences and perspective on falls prevention programs. For example, participants were asked to describe in detail what happened during their most recent fall, as well as if they had made any changes to help prevent future falls. Participants were also asked to describe their interest level in learning more about falls prevention and to provide a rationale for their response. They were subsequently asked to describe any motivators and barriers to participation in a falls prevention program. Both measures were piloted with a middle-aged adult who had sustained several falls in the last 2 years. Minor language edits were made as a result of this pilot interview.

Procedures

The principal investigator received approval for the current study from the Institutional Review Board (IRB) at New York University (i.e. NYU University Committee on Activities Involving Human Subjects). Participants were recruited and interviewed by graduate students who receive training in interview skills as part of their professional curriculum. They also received training in use of the specific study measures. Following informed consent, the background questionnaire was administered to collect participant demographics and other relevant information, followed by the administration of the semi-structured interview. All interviews were completed in private, were audio-recorded, and transcribed verbatim.

Analyses

Qualitative analysis was conducted using conventional content analysis [28]. Each transcription was read through carefully and significant statements pertaining to participants' falls experiences and prevention preferences were highlighted. A key word or phrase that captured the experience or preference was assigned to each significant statement. After open coding of several transcripts, preliminary codes were decided on. The remainder of the transcripts were read through and new codes added as needed if the existing codes did not fit the data. In order to enhance the reliability of the analysis and to reduce bias, a minimum of three coders/members of the research team independently read through each transcript, extracted significant statements, and coded the statements. Discussion until consensus occurred between the coders with regard to significant statements and their assigned codes. Following completion of coding, each coder grouped existing codes into themes according to their relatability. Once again, discussion until consensus occurred between the coders with regard to the themes.

Results

Participant demographics and background information are presented in Table 1. All participants in the sample were working and had pursued higher education by taking college courses or by completing a college degree. Following falls or near falls, 70% reported concern about falling.

The interviews began with a focus on the falls or near falls experiences of the ten participants. Three themes emerged including *precursors to falls, physical implications,* and *functional implications*.

Table 1 Descriptive statistics of sample (N = 10)

Gender N (%)	
Male	4 (40)
Female	6 (60)
Age M (SD)	57.3 (4.81) Range 51–63
BMI M (SD)	26.16 (6.59)
BMI category N (%)	
Normal weight	5 (50)
Overweight	3 (30)
Obese	2 (20)
Neighborhood N (%)	
Urban	3 (30)
Suburban	7 (70)
Race	
White	5 (50)
Asian	4 (40)
Black/African American	1 (10)
Work status	
Full-time	7 (70)
Part-time	3 (30)
Education	
Some College	2 (20)
College graduate	5 (50)
Graduate degree	3 (30)
Exercise	
Never	1 (10)
< 1 ×/week	2 (20)
Once a week	1 (10)
2–3 ×/week	1 (10)
4–6 ×/week	2 (20)
Everyday	3 (30)
Concern about falling before incident N (%)	3 (30)
Concern about falling after the incident N (%)	7 (70)

Precursors to the Falls

Participants described a number of precursors to their falls including the *context*, *locations*, *environmental hazards*, *surfaces*, *mechanism of falls*, *intrinsic factors*, and *behaviors*. The *context* in which the falls or near falls took place included what participants were doing, the time of day and/or year, and whether or not they were alone or with others. Some of the participants reported falls or near falls that occurred during their commute to work. One woman stated *"I was coming to work, and I tend not to rush to go to work. I walk at a normal pace, but at that time maybe my mind was somewhere else, like I was thinking about something."* Furthermore, several participants reported falls or near falls that happened while they were working at a hospital, bank, or in a classroom. One participated stated *"I'm a nurse and*

I was working, sitting working out of the office, and all of a sudden, I guess I jumped up, I think I heard a bed alarm going off so I jumped up to get it and my, I don't know, my leg just went out from underneath me." Some participants were actively engaging in recreational activities when their falls or near falls took place. One participant had completed a bike ride just prior and stated *"I had just finished leading in a bike ride. A fundraiser bike ride. It was 50 miles. And I just participated in the picnic and I was anxious to go home and shower"*. Falls occurred throughout all seasons and at all times of day. Half of the participants stated that they were alone when they experienced falls or near falls. However, some added that their coworkers, teammates, or other pedestrians were nearby during the incident. One individual stated that her husband was present in the room at the time.

Locations where the falls or near falls took place included indoor and outdoor environments. Common indoor locations were the home or participant's place of work. Other locations where falls took place included recreational areas. One participant described falling at a badminton gym, while another participant reported tripping at an outdoor tennis court. The first person stated *"I was playing badminton and… I was running backwards and I tripped and fell…"*

Environmental hazards were reported as contributing to falls or near falls in a number of locations. Participants described tripping over an object in their environment including pets and a bike stand. Three participants reported stumbling on steps. Uneven surfaces and surfaces with lack of contrast were also mentioned by participants. One participant indicated stumbling due to an uneven sidewalks when walking outside. They stated *"…the sidewalk was uneven, but I didn't notice it until I got right on top of it…"*. Another participant indicated falling due to a floor and ramp being the same color carpet. He described the following scenario *"The floor and the ramp were the same color carpet so there was no contrast as to, umm, where the ramp ended and where the floor began"*. *Surfaces* on which participants reported their falls or near falls took place included carpet, an area rug, concrete sidewalk, and tile. One individual stated that his fall occurred on an anti-slip mat that was placed on the tennis court to prevent individuals from falling.

Participants described the *mechanism of falls* including tripping, slipping, stumbling, and loss of balance. Most participants reported that they fell forward. One women stated *"I stumbled and my knee landed on top of the sprinkler head"*, while another participant said *"I was looking ahead for my car and tripped over a bike stand that had a piece of metal sticking up in the air…"*.

Intrinsic factors were also mentioned by some participants. Several participants expressed that their legs had either fallen asleep or gave way due to weakness. One participant stated *"…when I went off of the step…I just fell, I just had [no] power in my leg."* Although some of the participants were unaware of the cause of their falls or near falls, they suspect that their level of fatigue or alcohol consumption could have been a contributing factor. One person stated *"…it was late and I didn't get a lot if sleep the night before and I guess I was a little low [on] energy maybe." Behaviors* were also associated with falls or near falls including not paying attention, not looking down, and making sudden movements.

Physical Implications

Physical implications of the falls included *injuries*, *medical attention*, and *recovery*. Examples of *injuries* that ensued from falls or near falls included strained muscles, scrapes, and scratches. Some participants had more serious injuries including fractures requiring long periods of immobilization or surgery. Those with serious injuries sought *medical attention* through an emergency room or urgent care visit. Reported implications for *recovery* related to either ongoing pain or weakness. Additionally, a number of the participants who required medical attention reported attending physical therapy afterwards. One participant who fell at her place of work, sustained two fractured metatarsals. The participant sought medical attention through worker's compensation as well as urgent care. She described the following experience *"I called the Worker's comp and they gave me an appointment on the same day… They gave me a virtual doctor. She saw my symptoms and she saw my bone, like how bad they were, and there was so much swelling … And the next morning, I went to the urgent care."* The participant followed up with treatment with a physical therapist and was prescribed a boot and then a brace. She stated *"I see physical therapy three times a week, on Mondays, Wednesdays, and Fridays. The therapy started* 7 *weeks after I fell … the podiatrist gave a huge boot for* 6 *weeks…I had to keep it on* 24×7. *It was so hard sleeping in that. So then after the* 6 *weeks, I have this brace from the physical therapist for another* 6 *weeks."* It was found that all participants who reported requiring medical attention injured their lower extremity. One woman, who had tripped over a bike stand, fractured her hip and head of the femur as a result of her fall. She stated *"… they did the x-rays and said it was a broken hip and we're going to do surgery …I never would have [dreamt] that I would have [broken] my hip so young."*

Functional Implications

All participants who sought medical attention for falls also had functional implications. These included *daily life implications*, *emotional responses*, and *strategies implemented post-falls or near falls.* A range of *emotional responses* resulting from falls or near falls were reported including embarrassment, fear, surprise, and anxiousness. *Daily life*

implications describe ways in which participants had to make changes to their everyday activities as a result of falls and associated injuries. One woman was unable to leave her home for 6 weeks and had to modify her bathing and dressing routine. She was also unable to drive and did not return to driving even after being medically cleared. One participant who tripped on a bike rack after leading a 50 mile bike ride, revealed that her fear of falling again has prevented her return to biking as often as she had prior to the incident. Additionally, this participant reported feeling less confident in riding, causing her to bike less often. She stated *"I am afraid to get back on even though it wasn't a biking accident"*. Other participants also reported changes in leisure activities including discontinuing hiking or running outdoors, walking their dogs less, and having to add medications to their daily routine.

After exploring falls or near falls experiences, the interviews then focused on attitudes and preferences regarding prevention. Five themes emerged with regard to preferences for falls prevention programs including: *A continuum of interest, convenience is key, money matters, people you trust prompt action*, and *preventing future injury.*

A Continuum of Interest

Participants reported a broad spectrum of interest levels in falls prevention programming including no interest whatsoever, interest in receiving written information only, up to and including a strong interest in attending an organized falls prevention program. One participant stated *"I am getting older now so I think maybe you know…it's very possible it would help"*.

Convenience is Key

The results highlight that convenience is critical to participants' willingness to engage in falls prevention programs. Convenience included a number of factors including location, time, and program format/mode of delivery. Due to busy schedules, participants expressed the importance of locations that were easily accessible geographically, either in their own home or within a short travel distance. Participants stated that the program should be offered at a suitable time (e.g. in the evening or on the weekend). One participant stated "As long as it's close by, easy to get to and not too expensive". Regarding mode of delivery, participants responses varied but many were interested in some type of video format. Some participants were interested in delivery online through Facebook or YouTube. One participant stated the following regarding YouTube videos "I find them short, to the point. They are instructive because it's the camera and you just see the person doing the exercises." One participant stated that a video format would be more convenient, but that face to face with an instructor would be more helpful. Suggested in-person program locations included local gyms where people were already participating in physical activity, and center-based medical groups, where "everything is all in one spot" and "they have space to offer things".

Money Matters

For many participants, the cost of a falls prevention program was a significant determinant of whether or not they would participate. Specifically, low or no cost programs were described as an important factor. One participant stated "Well I think the only barrier [to participating in a prevention program] would be like if there was some exorbitant fee attached."

People you Trust Prompt Action

All of the study participants mentioned an interpersonal relationship or human interaction that would motivate them to participate in falls prevention. Participants stated that suggestions from healthcare professionals (i.e. primary care doctor, their physical therapists, occupational therapist or surgeon) held a lot of weight, therefore a referral or recommendation from one of these qualified individuals would increase their motivation and willingness to attend. One woman stated "I had a well-known surgeon so I would have respected [any recommendation] from him." On a more personal level, for some participants, family members and friends increased willingness to join a falls prevention program through joint attendance, providing emotional support, as well as through the desire to spread knowledge to a loved one. One participant expressed "I'm also not only taking it for myself but also my parents…I would like to know more about it so I can educate [my mom]…you have to look out for your family."

Preventing Future Injury

Fear of future injury as well as limiting potential risk for long term disability was the primary reason why participants expressed an interest in falls prevention programs. One participant stated "Well, anything to keep me from ending up in the hospital with a broken bone, twisted knee, something I have to go pay my doctor, would be a good reason…I know a lot of people who fall and then you know in their 60s and 70s they have major damage and then they are in trouble for the rest of their lives, I would prevent that." Another participant said "Well, I am interested because I don't want to fall down and break my neck, you know I want to be careful now. I am getting older now and if I break something or hurt something then it's going to take a long time to heal."

Discussion

Recent studies have demonstrated that the prevalence of falls increases steadily after age 40, yet very few, if any falls prevention programs target adults in mid-life [29]. In this qualitative study, we helped to fill this gap by exploring the falls experiences and prevention program preferences of mid-life adults who had experienced falls or near falls.

According to the results of our study, the context and location of falls were varied. However, consistent with previous studies, we found that environmental hazards were commonly associated with falls or near falls [7]. Although leisure time physical activity can have a protective effect for falls prevention [3], some falls were associated with physical activity participation, which is also consistent with prior studies on falls in adults [7]. Therefore, strategies for safe exercise and sports participation may warrant attention in falls prevention programs targeting middle-aged adults. We also add new information regarding the consequences of falls, specifically functional implication of falls and their impact on the daily lives of participants. Participants in our study had to make significant changes to their daily routine, including their mode of transportation, and several changed the amount and/or type of physical activity in which they engage.

With regard to falls prevention programs, the continuum of interest described by participants can be explained in part by the Transtheoretical Model [30]. Consistent with this stage specific theory of health behavior, people present at different stages along a continuum with regard to promoting their own health and well-being (i.e. precontemplation, contemplation, preparation, action and maintenance). Consistent with this model, people have different informational needs, therefore, falls prevention programs should be geared towards people at different stages in the process e.g. increasing awareness of the need for a change for people with no intention to take action about falls versus encouraging people to make specific plans around falls prevention for those at a later stage on the continuum.

The importance of recommendations from a trusted healthcare professionals was noted in our study and is not a new finding [27]. However, the results of our study highlight that one of the biggest motivators, besides a health provider recommendation, is fear of future injury and the long term disability that may ensue. Therefore, in addition to a specific recommendation from a healthcare professional, it may be worthwhile to provide information about the types and severity of injuries and their physical and functional implications when referring people at risk to prevention programs/services.

Among those that expressed interest in falls prevention programming, similarities were found between the results of our study and that of studies focused on prevention program preferences for people with chronic diseases. Specifically, the importance of convenience with regard to flexibility, location, and time of prevention programs was highlighted [27]. Although both chronic disease management and falls prevention involve behavioral change, falls prevention differs in that engaging in a program may not yield short term, "visible" results. Therefore, any behavioral changes made (e.g. increased focus on balance training at the gym, regular eye exams) may be difficult to maintain. For example, an effective diabetes self-management program will yield better A1C's, but a lower risk for falls is more difficult for a participant to see.

Preferences for modes of delivery and suggestions for preferred venues for in-person programs are noteworthy. A number of participants mentioned the utility and convenience of online platforms for learning, including publically available sites such as YouTube. With regard to in-person falls prevention programs, suggested venues included places that participants already frequented such as gyms and the centers that house their medical group. Although some people in mid-life may be physically active and go to the gym regularly, they may not be knowledgeable about the types of exercises that can help to prevent falls or be mindful of the effects of overexertion. Knowledge of effective falls prevention among middle-aged adults warrants further study.

Limitations of the study include the convenience sample of adults who all had some degree of higher education. Also, the retrospective data collection of falls experiences up to 2 years post-incident may have resulted in memory bias. However, despite limitations, our study adds new knowledge regarding falls experiences and prevention preferences among mid-life adults. Directions for future research include targeting specific cultural groups as well as the inclusion of focus groups as part of the research methodology. Large scale survey studies using representative samples are also called for in future studies to examine falls prevention knowledge and prevention preferences of this population group.

In conclusion, our study is consistent with previous findings, but adds new knowledge on the falls experiences and prevention preferences of adults in mid-life. Although further research is needed, the study has helped to build the body of knowledge in this area of inquiry and can begin to inform the development of falls prevention programs for this age group.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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