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Older Adult Knowledge and Behavior Change in the *Stepping On* Fall Prevention Program in a Community Setting

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One out of every three Americans age 65 and over falls at least once annually. Fall-related injuries among older adults are a major public health concern, and prevention of falls has emerged as a key issue in avoiding the risks to mobility and health that exist due to falls. Stepping On is an evidence-based fall prevention program designed to help older adults take control of their fall risk factors, explore different behavioral steps, and reduce their fall risk. This study shares findings from evaluation efforts conducted with 182 older adult participants in Stepping On from 2013 to 2015. Older adults in the program demonstrated (1) high satisfaction with program quality; (2) positive impacts on knowledge related to fall risk factors and prevention; and (3) substantial follow-through on behavioral steps designed to minimize fall risk. Program participants also shared positive feedback on the program in response to open-ended questions. Implications of the findings for fall risk reduction and programs to enhance fall prevention among older adults are discussed. Programs designed to reduce fall risk factors and enhance quality of life can be a critical tool to assist older adults, educators, and community leaders in addressing this public health issue.

Keywords: fall prevention, intervention programs, older adults, *Stepping On*, program evaluation

Introduction and Background

The Baby Boom generation has begun turning gray, and every day, there are now 10,000 Americans who turn age 65 (Pew Research Center, 2010). One of every three Americans age 65 and over falls at least once annually (Tromp, Pluijm, Smit, Deeg, Bouter, & Lips, 2001). For older adults, those who have had a fall previously are more likely to experience a fall again (Hosier & Setari, 2013). Such patterns have led to the designation of fall-related injuries among older people as a substantive public health problem (Roudsari, Ebel, Corso, Molinari, & Koepsell, 2005).

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Older adults may suffer a variety of injuries after falling that include hip fracture, head injury, joint injury, and other limb fractures (Tinetti & Williams, 1997). Moreover, following a fall, some older adults may be unable to recover their prior mobility (Sattin, 1992; Watson, Clapperton, & Mitchell, 2011). The threat from falling often causes older adults to decrease their activity level, which is likely to exacerbate difficulties with mobility and fall risk (Watson et al., 2011). Besides physical injuries and the related challenges, the fear of falling may increase anxiety, depression, and post-traumatic stress disorder (Chung et al., 2009; Downton & Andrews, 1990).

The public health issue of falls prevention becomes even more apparent when it is recognized that falls have become the most significant cause of emergency department visits and hospital admissions for traumatic injuries among individuals age 65 and older. Falls are the most common cause of traumatic brain injury in older adults and also serve as the leading cause of injury deaths among those over age 65 (Centers for Disease Control and Prevention [CDC], 2003, 2006; Sleet, Moffett, & Stevens, 2008; Stevens, 2005; Stevens, Corso, Finkelstein, & Miller, 2006). The most recent data available highlight falls prevention as a growing issue, as the data from CDC showed death rates of males aged 65 and over from falls changed from 38.2 per 100,000 in 2000 to 67.9 in 2013, while death rates of female counterparts doubled during this period from 24.6 in 2000 to 49.1 in 2013 (Centers for Disease Control and Prevention, 2015). Other major fall effects include compromising life quality, challenging adult independence, and raising the demands for medical treatment and caregiving either in private settings or in public health systems (Hosier & Setari, 2013). The cost of falls among older adults is enormous. In the United States, research indicates that fall injuries directly cost the health care system over $31 billion in 2015 and may cost as much as $55 billion by the year 2020 (Burns, Stevens, & Lee, 2016). As a result of the impacts on older adult health and healthcare costs, falls prevention and intervention has thus become a nationally urgent topic of interest (Moyer, 2012).

Many falls are preventable, and risk factors can be mitigated through prevention efforts (National Center for Injury Prevention and Control, 2015; Rubenstein & Josephson, 2006). Stevens (2005) noted that fall risks typically involve personal or environmental aspects. Personal factors affecting fall risk include age, functional abilities, and chronic diseases. Environmental aspects of fall risk tend to mean potential threats inside and outside the home, e.g., ice, poor lighting, or uneven steps (Connell, 1996). Modifying such risk factors has the potential to reduce falls (Stevens, 2005). Thus, entities such as the Centers for Disease Control and Prevention and the federal Department of Health and Human Services have begun providing resources and funding for communities to recognize and implement evidence-based fall prevention programs (National Center for Injury Prevention and Control, 2015). Research on such programs indicates that multifaceted fall prevention programs are more effective than efforts that target a single risk factor (Gillespie et al., 2012). *Stepping On*, a national evidence-based program on fall prevention, is designed to assist older adults to take control of their falls risk factors, explore

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different coping behaviors, and encourage follow-through of safety strategies in everyday life (Strommen, 2015).

The *Stepping On* program was originally developed by Lindy Clemson, OT, Ph.D., University of Sydney, Australia. Participants in a randomized controlled trial of the 7-week intervention demonstrated a 31% reduction in falls compared to nonparticipants (Clemson, Cumming, Kendig, Swann, Heard, & Taylor, 2004). In 2008, the program was adapted for U.S. audiences by Jane E. Mahoney, M.D., University of Wisconsin-Madison. Dr. Mahoney's research on the *Stepping On* program concluded a 50% reduction in falls and an average cost savings of $345.26 net per program participant (Carande-Kulis, Stevens, Florence, Beattie, & Arias, 2015; Mahoney, 2015). In 2010, the Wisconsin Institute for Healthy Aging (WIHA) was founded to support dissemination of the *Stepping On* and other evidence-based programs both statewide and nationwide (Mahoney, 2015). Currently, the program has been identified as meeting the criteria for the highest level of evidence-based programs by the Administration for Community Living under Title III-D of the Older Americans Act (National Council on Aging, 2016). Today, *Stepping On* is available in at least 22 states.

A Brief Overview of the Stepping On Program

In North Dakota (ND), falls remain the third leading cause of injury-related fatalities for all ages behind motor vehicle crashes and suicides (North Dakota Department of Health, 2011**)**. Between 2009 and 2013, 89% of falls-related deaths among ND residents occurred among individuals 65 years and older (North Dakota Department of Health, 2014**)**. There were 88 falls-related deaths among adults 65 years and older in 2013 (North Dakota Department of Health, 2014). The majority of falls among older adults occur in their homes (North Dakota Department of Health, 2011). As a result of such patterns, the *Stepping On* fall intervention program was introduced in 2012 by the state health department. Local and state entities have partnered to implement this program by training county Extension educators and others and providing evaluation services (Strommen, 2015).

Stepping On, as a community-based workshop, is offered as a two-hour workshop once a week for seven weeks using adult education and self-efficacy principles in a small-group setting (Clemson & Swann, 2008). Older adults who attend include those who (a) are at risk of falling, (b) have a fear of falling, or (c) have fallen one or more times. Additionally, individuals who are targeted for participation may live in a home, apartment, or other setting; have the ability to walk without help and do not typically use a walker, scooter, or wheelchair for mobility; and are able to cognitively understand and follow directions (Clemson & Swann, 2008). Workshops are facilitated by two trained leaders who are professionals who work with older adults. Following participation in the workshop, participants receive an individualized home visit or phone call and also a booster session after three months. *Stepping On* highlights a variety of topics including

"falls and risk, strength and balance exercises, home hazards, safe footwear, vision and falls, safety in public places, community mobility, coping after a fall, and understanding how to initiate a medication review (medication risks)" (Clemson & Swann, 2008, p. 1).

Theoretical models supporting fall prevention programs emphasize that multifaceted programs which attend to multiple fall risk factors including physical (e.g., strength), behavioral (e.g., safe footwear), and environmental (e.g., unsafe rugs) issues are most effective (Gillespie et al., 2012). The delivery model of the *Stepping On* program is based on social learning theory and adult education principles, suggesting that a small-group learning environment is best equipped to facilitate participant interaction, mutual learning and support, and growth in individual confidence and behavior change (Clemson & Swann, 2008). Although evidence for the effectiveness of the program was demonstrated in a randomized controlled trial in Australia (Clemson et al., 2004), the published research literature on the program since then is quite limited. The only additional published studies using participant outcome measures are quite recent, including two master's theses and a technical report (Anderson, Dinozo, Enrile, & Hutchison, 2013; Bernard, Lambers, Jones, & Trice, 2015), as well as three community-level public health studies (Guse, Peterson, Christiansen, Mahoney, Laud, & Layde, 2015; Mahoney, 2015; Peterson, Christiansen, Guse, & Layde, 2015) and a program cost-effectiveness study (Carande-Kulis, Stevens, Florence, Beattie, & Arias, 2015).

Existing studies have focused primarily or exclusively on falls or fall injury-related outcomes, with findings showing fall reductions ranging from 31% to 50% at the individual level (Clemson et al., 2004; Mahoney, 2015) or between 8% and 9% at the community level (Guse et al., 2015), measured anywhere from 3 months to 14 months after the program. Other variables studied include fall self-efficacy, fall-related prevention behaviors, and adherence to program recommendations, with mixed results. Findings related to fall self-efficacy indicate that participants have either maintained confidence levels without a significant decrease (Anderson et al., 2013; Clemson et al., 2004) or shown a slight but significant decrease (Peterson et al., 2015). Program results regarding fall-related prevention behaviors suggest increased use of safety behaviors by program participants (Bernard et al., 2015; Clemson et al., 2004; Peterson et al., 2015). Finally, two studies indicate moderate to strong adherence to program recommendations regarding exercise, vision tests, and other strategies (Anderson et al., 2013; Clemson et al., 2004).

No published studies exist, according to our knowledge, of the *Stepping On* program facilitated in a community setting in cooperation with the Cooperative Extension Service. Further, no study yet published has examined knowledge related to fall prevention or perceived value of the program although these are key program objectives. Additionally, no peer-reviewed study of the program, other than the original Clemson et al. (2004) study, has analyzed outcomes by demographic subgroup or reported qualitative feedback from participants about the program

experience. This study examines program value and learning-related variables that have been unstudied thus far, as well as practical program outcomes in a community setting linked with the Extension Service.

Most older adults have a strong desire to maintain independence and mobility, but they may need support in the process of retaining strength and managing issues that may affect their risk of falls (Stevens, 2005). *Stepping On* is a program designed to provide the needed support for older adults by improving knowledge of fall risk factors, providing strategies for safety behaviors, and facilitating community support.

Purpose of the Study

An in-depth review of programs and research related to falls prevention concluded the most effective fall intervention strategies used clinical assessment with risk factor reduction and patient follow-up (Shekelle et al., 2003). Assessment of educational interventions meant to aid older adults can provide information on how participants perceive a program and what aspects of the program are working (DeBord, Roseboro, & Wicker, 1998; Kettner, Moroney, & Martin, 2012).

The purpose of this study was to collect information on demographic characteristics of program participants and their perceptions of the program's value, as well as perceived outcomes related to knowledge and behavior associated with fall prevention. In addition, participants furnished feedback to open-ended questions regarding their experience in the program. This approach allowed for further assessment of how the *Stepping On* program affected participating older adults in its first two years of operation in North Dakota.

Methods

Program Participants and Study Procedures

Stepping On was introduced to North Dakota in early 2012 through a partnership between a variety of state entities and senior-serving organizations across the state. The initial phase of program start-up included designation of a sponsoring organization and certification of class leaders. The next phase focused on training community class leaders who could bring the program to local senior populations. Currently, there are over 70 trained class leaders from 29 counties with backgrounds in health care or health education representing a range of organizations, such as public health, hospitals, long-term care, Extension, faith communities, and senior care providers. Each class leader was trained in *Stepping On* course content, implementation, and evaluation procedures adopted for the project.

Participants in the program are senior individuals at risk of a fall who live in local communities that have a trained class leader to offer the program. Since the program was launched in March 2012, there have been 26 workshops conducted statewide with 308 individuals participating. Not all workshops have collected evaluation data. As of March 2015, 12 counties have held *Stepping On* workshops with a total of 222 participants enrolled in 21 workshops where data were collected. One hundred and eighty-two participants completed the program survey, giving a response rate of 82%. All participants attended the program on a voluntary basis and participated in four or more sessions of the program to be included in the evaluation.

Class leaders recruited individuals to their respective *Stepping On* workshops using the following participant criteria: (1) 65 years or older, (2) has had a fall in the past year, (3) is fearful of falling, (4) lives at home, and (5) does not have cognitive impairments. Numerous marketing techniques were used to recruit participants, such as flyers, brochures, news releases, community announcements, and referrals from health care professionals. Prospective participants who had physical or cognitive concerns or questions were asked to consult with their physician before attending the training. In addition, if participants missed both sessions 1 and 2, they were encouraged to wait for another class because of missing key experiences and information.

Class leaders were responsible for facilitating informed consent, distributing and collecting program surveys, and mailing the completed surveys to the state Extension office for evaluation. Data were entered in IBM SPSS Statistics 24 for analysis. Those participating in *Stepping On* were asked to complete a retrospective self-report questionnaire administered at completion of the program. Three months after completing the program, participants came together again to engage in a program "booster session," and during that session, they were also encouraged to complete a follow-up survey. This post-program retrospective study design with a 3-month follow-up assessment was adopted for several reasons. First, the retrospective design provided a practical, valid approach to assess for program outcomes, control for concerns about response-shift bias, and account for lack of familiarity with program content among participants (Nimon, Zigarmi, & Allen, 2011). Additionally, this study design was easy to administer in a community-based setting among staff with limited research experience while also maximizing the capture of data from participants. Finally, the study design met the need to operate in an environment with no designated evaluation funding and yet meet the objectives of state personnel who desired greater information on program outcomes. No incentives were provided for survey completion. The study was reviewed and approved by the North Dakota State University Institutional Review Board (IRB).

Study Measures

The retrospective post-program questionnaire utilized for this study was developed as a program evaluation instrument based on the objectives and content of the *Stepping On* program. The

developed measure offered a more substantial approach than the existing assessments which accompanied the program itself, which were limited to single-session assessments of program satisfaction. The questionnaire included 6 questions on demographic characteristics of participants, 5 questions on perceived value and impacts of the program (4 open-ended response questions), 7 questions focused on knowledge related to fall risk factors addressed in program content, and one question on prior fall experience. The follow-up survey repeated the question on fall experience (since the workshop) and included 9 questions on behavioral steps to minimize fall risks, and 4 questions on perceived value and impacts of the program after three months.

Demographics. Demographic characteristics assessed in the study included sex, age, race/ethnic background, family status, household population, and residential setting. Additional background information included workshop location and if the participant had experienced a fall in the last year, and if so, the cause of the fall. The information on cause of the fall was categorized based on a thematic analysis of data provided.

Perceived program value and impacts. Both the post-program and follow-up questionnaire included a single question assessing perceived program impact. In the first survey, perceived program impact was measured using a question that assessed participant learning on a 5-point scale from 1 (*nothing*) to 5 (*a lot*). The follow-up survey utilized a question that assessed fall risk reduction using a 5-point Likert scale from 1 (*not at all*) to 5 (*a great deal*). In addition, further impacts were assessed using open-ended questions on each survey that asked about most important things learned, planned behavior changes, and other feedback.

Knowledge related to fall prevention. Participant knowledge regarding risk factors related to fall prevention was measured using a retrospective self-report measure based on the content of *Stepping On*. Seven items using a 5-point Likert scale ranging from 1 (*low*) to 5 (*high*) were measured and included items such as "my understanding of how vision can influence the ability to get around safely" and "my understanding of the relation between medications and falls." These 7 items were grouped into a scale on fall prevention knowledge with a composite mean score. Cronbach's alpha for the scale was 0.91 at pre-test and 0.89 at post-test.

Behavioral steps linked to fall prevention. Behavioral actions taken by participants to minimize fall risk were measured at three months follow-up using a self-report mechanism. Nine items were included using a dichotomous *no* (0) or *yes* (1) response to each item. Sample items included whether participants "had a regular eye exam" or "practiced exercises routinely" in the three months following completion of the program.

Qualitative participant feedback. Participants were asked to share responses to the following questions: (1) Which of your behaviors are you most likely to change? (2) List the three most important things you learned in this workshop. (3) Other comments on the workshop.

Findings

Findings highlight the views of older adult participants regarding the *Stepping On* program's value, perceptions of program impacts on knowledge and behavioral actions linked to fall prevention, and the influence of demographic variables on knowledge and feelings about program value.

Program Participants

A total sample of 182 older adult participants completed the initial post-program questionnaire. Seventy-five percent of respondents were women, while 21% were men. The mean age was 76.72 years (SD = 10.1 years). The majority of respondents (90.7%) reported themselves as Caucasian, followed by American Indian or Alaska Native (2.2%) and Asian or Asian-American (1.6%). Forty-five percent of participants reported their family status as being widowed, followed by married (33%), divorced or separated (10.4%), and never married (6.6%). Among participants, 57.1% of respondents reported living alone, followed by living with one other person (36.3%), and living with two other persons (0.5%). Nearly half (46.7%) reported living in a city (or its suburbs), followed by a small town (37.9%), and a rural setting (10.4%) (Table 1). Seventy-two individuals also completed the follow-up survey (39.6% of overall sample).

Table 1. Demographics Table for Pre- and Post-Evaluation (N = 182)

Variable	*N* (%)
Gender	
Male	38 (20.9)
Female	136 (74.7)
No response	8 (4.4)
Age	
Younger than 64	16 (8.8)
65 to 74	43 (23.6)
75 to 84	73 (40.1)
85 and older	40 (22)
No response	10 (5.5)
Race	
White	165 (90.7)
Hispanic	1 (0.5)
American Indian/Alaska Native	4 (2.2)
Asian	3 (1.6)
No response	9 (4.9)
Family Status	
Married	60 (33)
Divorced/Separated	19 (10.4)
Widowed	81 (44.5)
Never Married	12 (6.6)
No Response	10 (5.5)

Variable	*N* (%)
Living Circumstances	
Lives alone	104 (57.1)
Lives with 1 person	66 (36.3)
Lives with 2+ persons	1 (0.5)
No Response	11 (6)
Residence	
City or city suburbs	85 (46.7)
Small town	69 (37.9)
Rural	19 (10.4)
No response	9 (4.9)

Prior Fall Experience

Participants were further asked if they had experienced a fall in the last year, and 46.2% of the older adults indicated "yes" (53.8% stated "no"). Of those who had experienced a fall, 23 identified it as being due to a missed step or stumble for varying reasons (29.1%), 14 said it was due to slipping on ice or snow (17.7%), 10 stated it was due to missing a step on stairs (12.6%), 8 noted it was due to a "balance" concern (10.1%), 7 due to tripping over an item (e.g., rug, chair) (8.9%), 7 said it was because of an uneven walking surface (8.9%), 5 indicated it was because of footwear issues (6.3%), 5 stated it was due to physical injuries (e.g., hurt ankle) (6.3%), and others noted dizziness or other issues that contributed to the fall (Table 2). The responses to this question were open-ended.

Table 2. Fall Reasons for Older Adults in the Year Before Program Participation (N = 79)

Identified Reason for Fall	*N*	%
General misstep or stumble (being careless, feet tangled, etc.)	23	29.1%
Slipping on ice or snow	14	17.7%
Missed a step on stairs	10	12.7%
Balance difficulties	8	10.1%
Tripping over item (e.g., rug, chair)	7	8.9%
Uneven walking surface	7	8.9%
Footwear issues	5	6.3%
Physical injury (e.g., hurt ankle, bad back)	5	6.3%

Perceived Value of the Program

Older adults participating in *Stepping On* expressed high levels of support for what they learned overall. They responded to a single-item question on a 5-point scale regarding how much they learned overall, and this variable showed a moderate amount of skewness, as assessed by the Shapiro-Wilk's test ($p < .05$), though visual examination of the Normal Q-Q plot showed approximate normal distribution, so both the mean and median statistics are reported here. Participants indicated they gained much from what they learned in the session ($M = 4.68$; $SD =$

0.58), with *Mdn.* = 5 (*IQR* = 4 – 5). Thus, 73.7% of participants indicated they learned "a great deal" from their participation in the sessions, followed by those who felt they gained significant value (20.5%) and some value (5.8%) in what they learned.

Participant scores on the follow-up survey to an additional item on program value were not normally distributed, as assessed by the Shapiro-Wilk's test ($p < .05$), but again visual examination of the Normal Q-Q plot suggested normal distribution. On this 5-point scale, older adults who responded felt that the program helped them to reduce their risk of falls very substantially ($M = 4.07$; $SD = 0.6$), with *Mdn.* = 4 (*IQR* = 4 – 4). In their responses, 88.4% of participants stated that they felt the program helped to reduce their fall risk "very much" or "a great deal," while an additional 10.1% felt that it helped "to some extent."

Perceived Program Impacts on Knowledge Related to Fall Prevention

Older adults in the *Stepping On* program were asked to complete a retrospective assessment of their specific knowledge related to risk factors influencing falls following program completion. These areas of knowledge are linked with specific fall risk factors that can be addressed or modified by adult learners after the program experience. By assessing the older adults' perceptions of their knowledge levels both prior to and following the program, it is then possible to gain further insight into how their experience in the program may have impacted their knowledge gain. Participants responded to seven items on a 5-point Likert scale with response options ranging from 1 (*low*) to 5 (*high*). The average mean knowledge scores on each item from "before participation" were compared with the scores from "now, after participation," making it possible to do a statistical comparison of the differences in knowledge level before and after program participation. Steps were first taken to assess whether the data met the statistical assumptions associated with this type of analysis. First, no significant outliers were discovered in the difference scores between the paired observations for each variable. Also, the difference scores on each item for the pre- and post-program ratings were calculated and were approximately normally distributed, as assessed by visual inspection of the Normal Q-Q Plot. Thus, since assumptions were met and it is a robust test statistic, a paired sample *t*-test analysis was conducted to perform the comparisons and examine whether the program had any impact on participant knowledge levels regarding fall risk factors.

The study findings indicate that participants described largely positive impacts as a result of participating in the *Stepping On* program. Table 3 includes the average mean knowledge scores and standard deviations before and following the program, as well as mean score differences, *t*-test findings, and effect sizes. A set of paired sample *t*-test analyses showed substantial increases in participant knowledge of fall risk factors for each item measured and each of the before-and-after mean comparisons was significant ($p < .05$). The mean scores for self-reported knowledge levels of fall risk factors after participation thus increased significantly versus the mean scores

for knowledge levels before the program. Following the program, participants felt much more knowledgeable about vision and falls, balance, home safety hazards, safe footwear, and other fall risk issues (Table 3). The largest gains occurred in participant awareness of the importance of balance and strength exercises for fall prevention (M = 2.79 before program versus M = 4.75 after program) and confidence in understanding how to apply safe movement strategies to avoid falls (M = 2.89 before program versus M = 4.60 after program). Effect sizes were calculated using Cohen's d and indicated large program effects on knowledge gain ranging from 2.10 to 2.68.

Table 3. Differences in Knowledge of Fall Risk Scores Before and After Participation in the Stepping On Program

	Before Participation		**Now, After Participation**						
Knowledge Item	***M***	***SD***	***M***	***SD***	***df***	***t***	***N***	**Mean difference**	**Cohen's *d***
Importance of vision and falls	3.06	1.08	4.61	.60	152	-17.50	153	1.56*	2.13
Importance of exercises and falls	2.79	1.03	4.75	.58	158	-22.83	159	1.97*	2.68
Awareness of hazards at home	3.01	1.12	4.67	.61	157	-18.49	158	1.66*	2.23
Safe footwear and falls	3.18	1.03	4.72	.49	157	-17.89	158	1.54*	2.18
Applying safety strategies	2.89	1.00	4.60	.60	157	-19.91	158	1.72*	2.32
Relation of medication and falls	3.03	1.11	4.64	.62	158	-18.34	159	1.60*	2.21
Bone health and falls	3.19	1.09	4.67	.61	158	-17.38	159	1.48*	2.09

*$p < .05$

Behavioral Actions Linked to Fall Prevention

Following involvement in *Stepping On*, older adults were given a follow-up survey three months later and answered 9 *yes/no* questions regarding behavioral steps linked to fall prevention. A simple frequency analysis was conducted to determine the proportion of participating adults who pursued specific behaviors associated with fall prevention following the program. Participants were not asked about these behaviors before the program so there is no baseline for comparing participant actions; however, the findings reported provide insight into how participants followed up on specific behavioral steps.

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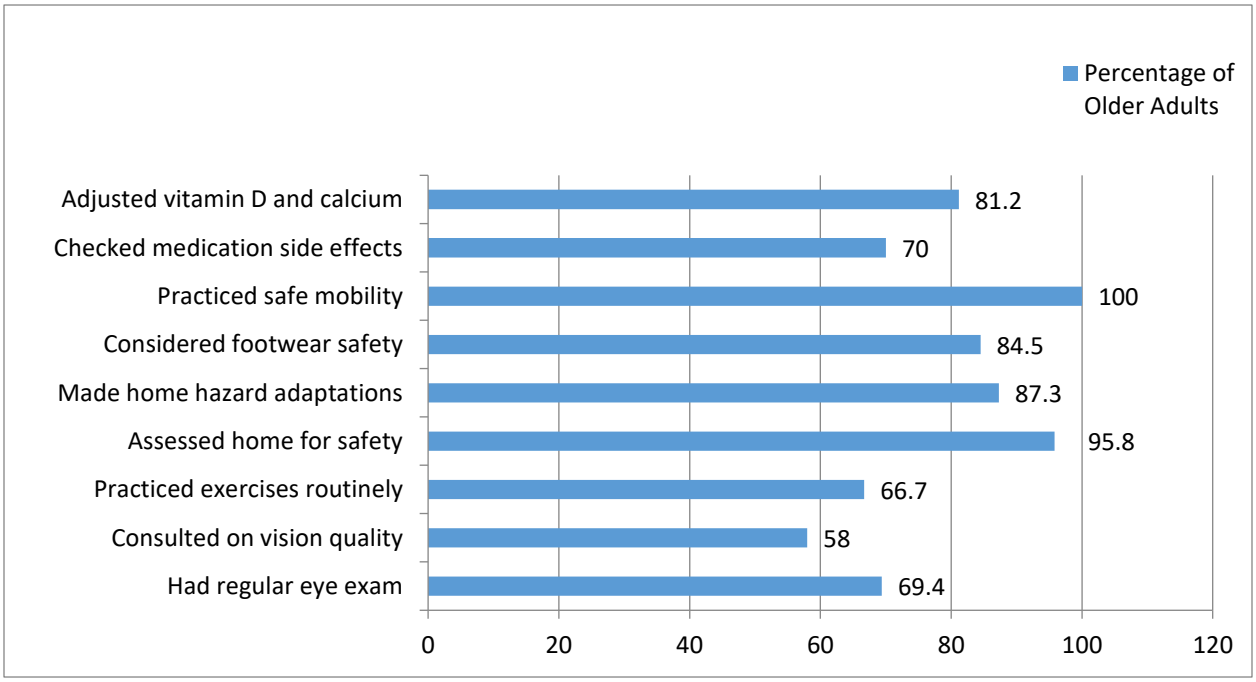
Figure 1 highlights behavioral steps linked to fall prevention taken by participating older adults. Among those who completed the follow-up survey (*N* = 72), 69.4% reported having had a regular eye exam, and 58% indicated that they had talked with a vision expert about improving their vision. With respect to exercise, 66.7% of participants noted that they had been practicing exercises taught in the class routinely. Participants responded strongly to the topic of home safety hazards, with 95.8% of the adults stating that they had assessed their home environment for safety hazards, and 87.3% indicating they had made adaptations or adjustments to reduce home safety hazards linked to falls. Eighty-four percent of respondents said that they considered safety features in choosing footwear since the workshop. The highest percentage of adults taking specific actions related to mobility approaches, with 100% of the adults declaring that they practiced safe mobility techniques following program involvement. Finally, 70% of participants had learned more about the possible side effects of medications, while 81% of the adults calculated and made adjustments to their intake of vitamin D and calcium if it was needed.

In the three months since the workshop, 21.1% of older adults indicated that they had experienced a fall. This finding was less than half of the percentage that had fallen in the year prior to the workshop. Among those who fell, the primary reasons cited were ice or snow, loss of balance, lack of attention, or a home safety issue. Although the percentage of participants who fell in the three month period (21.1%) cannot be directly compared to the percentage who fell in the year prior to the workshop (46.2%) since those who responded following the workshop were a subset of participants and the time periods were different, the contrast is interesting to consider and further exploration of this outcome would be recommended.

Figure 1. Behavioral Steps Linked to Fall Prevention



Note: N for each item is available from the authors.

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Demographic Influences on Participant Learning

Another question of interest for this study was whether participant learning about fall prevention was associated with any of the demographic variables assessed in the study. The demographic items examined as independent variables in this analysis were gender, age, family status, number of persons in the household, residential location, and whether the person experienced a fall in the last year. Two dependent variables, a single-item measure of overall participant learning and a composite measure of the participant's gain in fall prevention knowledge, were utilized in the statistical analysis. The measure of knowledge gain regarding fall prevention was calculated as a composite mean score of the difference between pre- and post-workshop knowledge scores on 7 items pertaining to fall risk. This measure showed approximately normal distribution based on visual inspection of the Normal Q-Q Plot. A series of statistical analyses using analysis of variance (ANOVA) were conducted to explore the influence of each demographic independent variable on participant responses to the program.

Independent variables that were dichotomous included gender, number of persons in the household (alone versus two or more persons), and experience of a fall in the last year (no or yes). Age included four categories (ages 30 to 64; ages 65 to 74; ages 75 to 84; and age 85 or over). Participant family status included three categories (married; widowed; and divorced, separated or never married). Finally, residential location also included three categories (rural, small town, and city). The significance level for p was set at .05 for the statistical analyses. The first set of analyses used ANOVA to assess whether the identified demographic variables had any meaningful association with overall participant learning. No statistically significant relationship was identified between participant gender, age, family status, number of persons in the household, residential location, or fall experience in the past year to the measure of overall participant learning. In other words, the analyses suggest that these particular variables do not significantly influence how participants rate their overall learning after participation in the *Stepping On* program.

Additionally, a series of ANOVAs were calculated for each independent variable in relation to the dependent variable of participant knowledge gain related to fall prevention. Again, there were no statistically significant associations that emerged between participant knowledge gain and any of the demographic variables noted above that were used in the analysis. Thus, the amount of knowledge that participants perceive they gain following program participation does not seem to vary significantly due to gender, age, number of persons in the household, previous fall experience, or any of the other factors assessed.

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Qualitative Responses to the Program by Older Adults

Participants were asked to respond to a brief series of open-ended questions at the end of the program. These responses were grouped for each question and analyzed for key themes that emerged in the answers.

Behavioral changes most likely to be made. Participants identified three or four behavioral steps as most likely to change. First, participants indicated they were most likely to continue or increase the balance and strength exercises learned in the program, as well as walk more in general to increase strength. One participant stated, *"I will continue exercises because I feel I am safer since I started."* Another behavior change many participants stated they were likely to make was to practice safe mobility techniques. Specific mobility actions shared by participants included walking heel-to-toe, scanning ahead when walking, and being aware of uneven surfaces so as to avoid falls. Finally, doing things more slowly and cautiously, and addressing home safety issues were additional steps participants were likely to take to reduce the risk of falls.

Important concepts learned in the program. Participants were asked a question about the most important things learned both at the immediate end of the program and three months after the program. At the end of the program, the participants overall cited the topics of exercise and safe mobility techniques as the areas of most significant learning. Two other areas mentioned frequently by participants were medications and home safety.

Responses to the follow-up survey three months later showed consistency. Again, the most frequently cited topic by participants was safe mobility techniques and included comments, such as (1) how to stand from a sitting position, (2) how to get up from a fall, and (3) getting in and out of a car safely. Another area mentioned by participants was exercises, including comments about the importance of practicing exercises routinely to maintain improvements in strength and balance. Further, home safety was a frequently stated topic, including comments about improving the safety of their homes and being constantly aware of potential hazards.

General comments on the workshop. Overall, the comments were very positive with three themes emerging: (1) Participants perceived the workshop to be a valuable learning experience, (2) The workshop leaders and guest experts contributed greatly to workshop effectiveness, and (3) The small group format contributed positively to participants' experience. The following quotes represent participant responses:

- *"This was a wonderful workshop and I recommend it to other people. My balance has improved."*
- *"The time was well spent and topics were of value to me to preserve my health and mobility."*

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- *"A program such as this one gives me courage to keep living my life."*
- *"Presenters were excellent, encouraging, and professional."*
- *"Great class, great leaders, great environment, highly recommend this class!"*
- *"We had the right number of people to have good discussion."*
- *"Nice to hear other participants' comments, socializing was nice, too!"*

Discussion

Fall-related injuries among older adults are a major public health concern due to the impacts on older adult health and quality of life and the direct costs to the health care system. However, falls are largely preventable, and state and federal entities are providing resources and funding to recognize and implement evidence-based fall prevention programs at the community level. This study suggests the *Stepping On* program has significant and positive benefits for participants in a community-based setting.

The findings from this study originated from the initial two years of implementation of the program. At the time this project originated in 2012, only one other published study on the program existed, thus comparative information based on research was very limited. We provide a brief review of findings from this study and linkages with other research on the *Stepping On* program that has been published recently.

In this study, 46.2% of participants at baseline indicated they had fallen in the previous year, while 65.3% indicated a fall in the previous year in the original Clemson et al. study (2004). No other study on the program has identified fall reasons for older adults based on our review, yet the "fall reasons" were identified and included in this study (see Table 2). Since the reasons for falling can include a number of factors ranging from personal injury such as a hurt ankle (physical) to slipping on ice (environmental), we suggest it can be helpful to know such information for purposes of targeting prevention strategies to fall sources that individuals encounter. Only one out of five (21.1%) participants who responded to the follow-up survey at three months had fallen during that time period, suggesting a possible reduction in falls, but this finding needs further study with more careful assessment and a longer time frame for follow-up.

Fall self-efficacy, which essentially measures a person's confidence related to fall risk, has been measured in some of the existing research on this program. Past results indicated that program participants maintained confidence or had only slight reductions in their fall self-efficacy, while nonprogram participants showed declines in their fall self-efficacy after a year (Anderson et al., 2013; Clemson et al., 2004), although the most recent study showed a slight but significant increase in fear of falling (Peterson et al., 2015). Anderson et al. (2013) utilized a researcher-developed measure of fall-related confidence and reported that participants self-reported increased levels of confidence in preventing a fall. Similarly, at three months follow-up, nine out

of ten participants in our study reported that they strongly felt the program had helped them to reduce their fall risk.

Participant use of fall-related prevention behaviors is another variable that research on the *Stepping On* program has included. In three existing studies, researchers found small but significant increases in the use of fall prevention safety behaviors by program participants (Anderson et al., 2013; Clemson et al., 2004; Peterson et al., 2015). In our study, though there was no baseline measure (similar to Clemson et al., 2004) of fall-related prevention behavior, participants at three months follow-up reported engaging in a wide array of safety behaviors related to fall prevention (e.g., routinely practicing their exercises [66.7%]; see Figure 1). Though only 43 percent of our participants completed the follow-up survey, the findings that exist are encouraging and confirm previous studies that show positive effects on fall-related prevention behaviors. Our study adds to this information by demonstrating that similar results can occur when the program is implemented in a community setting by Extension staff and other local partners.

Among the unique outcomes studied in this project that have not been examined in previous research on the *Stepping On* program, we included measures of fall prevention knowledge, perceived value of the program, and variations by selected demographic factors. Qualitative feedback from participants was also reported in this research study, which has not been included in previous studies. The study findings indicate the program has made a positive impact in the level of knowledge related to fall risk factors and prevention and in the substantial follow-through on behavioral steps designed to minimize fall risk. As it has been suggested that increasing participant knowledge of fall risk and prevention behaviors is a core program objective, we felt it curious that it has not been examined previously, but this study does show that the program has positive impacts in this area. Another important finding from the study showed overall participant learning and participants' perceived knowledge gain following program completion were not significantly influenced by participant gender, age, family status, number of persons in the household, residential location, or fall experience in the past year. This pattern suggests *Stepping On* is an appropriate and effective intervention approach for a large portion of community-dwelling older adults. The qualitative participant feedback also revealed the program to be a valuable learning experience, with key elements such as the small group format and use of guest experts contributing positively to the participants' experience.

While findings associated with this program evaluation are encouraging, the limitations in this study should also be mentioned. The sample population was not highly diverse, consisting of mostly Caucasian, older women, though there was variation across family status, residential location, and other factors. Therefore, further research with a broader cross section of the population will be necessary to assess whether outcomes are similar with other segments of the older adult population. Also, using a retrospective post-then-pre design has received some

critique, so further assessment using other research methods is recommended. There was no baseline measure of specific behaviors associated with falls prevention obtained before the program to compare to participant actions taken after completing the program. However, the follow-up survey findings seem to indicate the *Stepping On* program is having a positive impact on participants taking behavioral actions linked to fall prevention. Finally, the response to the three-month follow-up survey was fairly limited, and it may be that those who responded were those participants who were more likely to engage in fall prevention behaviors.

Implications and Applications

The overall positive evaluation of *Stepping On* should serve as a motivational influence for current class leaders and their sponsoring organizations to continue offering the workshops in their respective communities. In addition, other organizations evaluating the possibility of offering *Stepping On* as a new program in their communities may benefit from the availability of such findings to use in their decision-making processes. As the *Stepping On* program continues to grow, falls-related injuries and deaths should be monitored to determine the statewide impact of this program. A few implications for Extension and community settings are discussed, as well as implications for research and programming generally with regard to this program.

Implications for Extension and Community Settings

To launch the program's implementation, the Extension Service was approached as a key partner when the state health department sought to implement a fall prevention program statewide. After the implementation phase began, the Extension Service was further identified as an entity that could assist with the challenging process of program evaluation and reporting on a limited budget. Within the state, this initial evaluation data will be relevant in showing results and developing new partnerships to grow the *Stepping On* program, which in turn can result in increased participant enrollment, an increased number of workshops offered, and an increased number of counties offering the program. The goal should be to build stronger relationships between clinical and community-based settings, fostering a more coordinated approach to falls prevention in the state. As these next steps are taken, we hope to adapt the evaluation and use a more rigorous approach to examine the longer-term impacts of *Stepping On*.

The findings of the project should also be useful to Extension Service personnel interested in implementing a falls prevention program, such as *Stepping On*, by better understanding potential opportunities and challenges. Establishing a strong set of partnerships was a key factor to the program being launched and delivered effectively, allowing for the leveraging of resources such as time, expertise, and funds. The local health department agency had grant funding for training of class leaders, which covered the registration fees and travel costs for participants. Easing the financial burden for participants (including Extension staff) and their sponsoring organizations

was a necessary motivational approach to encourage involvement in this new program. Each entity brought resources to the partnership for implementing the program. The state health department also held the program license and was responsible for overall program administration. The Extension Service was able to provide program evaluation and the educational expertise and geographical reach of county Extension agents who became trained as class leaders. Local Extension agents formed new partnerships with local health and senior service providers to co-deliver the workshops. These local partnerships helped ease the time burden involved in delivering the workshops and also opened the door for new collaborative initiatives. In a rural state with many counties having a higher percentage of elderly residents, the *Stepping On* program has garnered the interest and support of key community leaders and funders, such as county commissioners.

The Extension Service was asked to design an evaluation approach quickly after the program launched. The use of a retrospective study design for program evaluation may fit well with requirements for program evaluation and reporting that are common in the Extension setting. Additionally, it also seems to provide a good "fit" with the resources and abilities of Extension and other programming staff working at a practice level or program operations level in the local community context. Though there are challenges, it seems possible to both implement a fall prevention program with Extension support and collect information that will be useful for evaluation and reporting as needed.

Implications for Fall Prevention Research and Programs

Findings from this study that merit additional consideration and exploration with regard to application and interventions related to fall prevention include the following:

- It is possible to implement an evidence-based fall prevention program, such as *Stepping On*, in a community-based setting with older adults. The ability to support such a program is furthered by developing local partnerships with adult-serving entities, cooperative local government, and educational institutions such as Cooperative Extension.
- In this study, nearly half of older adults had experienced a fall in the previous year due to a variety of reasons. Assessing fall experience and the reasons for such incidents can inform the context in which such a program is implemented and provide focus for discussion during sessions of the program so that key fall risks are addressed.
- Participants expressed high levels of satisfaction with the program and selected elements such as small group discussion and presentations by guest experts in each topic area. These elements are part of the evidence-based model for *Stepping On*, and

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the positive response suggests the value of fidelity to elements of the program model when operating an evidence-based educational program.

- The findings indicated significant changes in participant knowledge of fall risk topics for participants before and after their involvement in *Stepping On.* The topics that showed the highest gains based on effect size, such as balance and strength exercises and safe mobility techniques, were also those mentioned as being of most importance by participants three months following the program. While all topics covered in the program are valuable, these findings may suggest that these topic areas are of primary importance or furnish the most opportunity for participant learning and application.
- While only about 40 percent of participants completed the follow-up survey, a high proportion of those responding (between 60 and 100 percent on each item) noted that they had taken specific behavioral steps to reduce fall risk. Strategies to remind participants of lessons learned and encourage follow-up actions to reduce fall risk would be valuable to explore and implement between the end of the program and the booster session three months later.
- Study findings showed that demographic factors, such as age, gender, family status, number of persons in the household, residential location, and previous fall experience in the past, did not have a meaningful association with overall participant learning or perceived knowledge gain regarding fall prevention. This pattern increases confidence that the program can be implemented and be successful with older adults across a wide range of such conditions.

These implications and others that emerge from the implementation and assessment of the *Stepping On* program provide a variety of points to consider when pursuing and implementing educational interventions for fall prevention with older adults.

In conclusion, this study demonstrates the effectiveness of the *Stepping On* program in assisting older adults to gain a greater awareness of fall risk factors, take control of their fall risk factors, explore different coping behaviors, and follow through on safety strategies in everyday life. As the Baby Boom generation continues to age, interventions designed to assist them in maintaining independence, mobility, and quality of life will be increasingly important. The Extension Service can function as a critical and effective partner in facilitating such programs and bringing their benefits to the lives of older adults.

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