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Short Research Report

Effect of the Matter of Balance Program on Balance Confidence in Older Adults

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Abstract. This pre/posttest study investigated the effect of A Matter of Balance: Managing Concerns about Falls (MOB) on balance confidence in older adults. MOB is an evidence-based program designed to decrease fear of falling and increase activity in older adults. Thirty-three participants completed the Activities-specific Balance Confidence Scale (ABC) pre- and postprogram. Significant differences were found for 3 items: reach for small can off a shelf at eye level ($p = .006$), walk outside the house to a car parked in the driveway ($p = .028$), and walk outside on icy sidewalks ($p = .009$); and for total ABC scores ($p = .024$). The findings support the efficacy of MOB for increasing balance confidence through a combination of education and exercise.

Keywords: falls, balance confidence, fear of falling, older adults

Falls in older adults are a worldwide public health concern (World Health Organization, 2007), and numerous reports have highlighted the extent of this problem (Bouldin et al., 2013; Korhonen, Kannus, Niemi, Palvanen, & Parkkari, 2013; Kannus et al., 1999; Mack, Rudd, Mickalide, & Ballesteros, 2013; World Health Organization, 2007). Falls in older people lead to substantial economic and human costs, which are largely preventable if risk factors are addressed and managed. Modifiable risk factors that have been identified include gait and balance problems, muscular weakness, impaired vision, cognitive insufficiencies, and home and environmental hazards (Ambrose, Paul, & Hausdorff, 2013). Of these risk factors, gait and balance problems have often been reported as the “strongest risk factor for falls” (Ambrose et al., 2013). Age-related changes in posture control, strength, height of stepping, and sensory systems contribute to decreased ability to avoid a fall (Rubenstein, 2006). Assessment of balance is recommended for older adults who have experienced a fall as a screen to identify persons who may benefit from a multifactorial fall-risk assessment and interventions to modify risks for falling and reduce falls (Panel on Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society, 2011). Many of the evidence-based exercise programs for falls prevention include a balance component (Stevens, 2010).

A history of falls is a risk factor for developing fear of falling (FOF) (Friedman, Munoz, West, Rubin, & Fried, 2002; Howland et al., 1998; Scheffer, Schuurmans, van Dijk, van der Hooft, & de Rooij, 2008). Approximately 50% of community-dwelling older adults report FOF (Howland et al., 1998; Zijlstra et al., 2007). Among those who have fallen, 40% to 73% report FOF (Jette, 2013), and approximately half of individuals who report FOF have not experienced a fall (Jette, 2013; Scheffer et al., 2008). FOF is associated with declines in physical and mental function, increased risk of falling, and decreased health-related quality of life (Scheffer et al., 2008). FOF is an independent predictor of becoming a faller, and people who limit their activities due to FOF are at a higher risk of falls (Friedman et al., 2002). A strategy for reducing falls includes a multifactorial risk assessment, and FOF should be part of this risk assessment (Panel on Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society, 2011). FOF has been operationalized as a continuum of balance confidence (Powell & Myers 1995; Tinetti, Richman, & Powell, 1990). Powell and Meyers (1995) suggested that improving balance confidence may be as vital as physical training for balance rehabilitation.

Balance confidence measures assess an individual's confidence in performing certain activities without falling (Hadjistavropoulos, Delbaere, & Fitzgerald, 2011). Li and

colleagues (Li et al., 2002) found that, while FOF was inversely related to physical function measures of balance including the Berg Balance Test, Dynamic Gait Index and the Functional Reach Test, the mediating effect of balance confidence made the relationship significant. Several other authors (Lajoie & Gallagher, 2004; Talley, Wyman, Gross Lindquist, & Gaugler, 2014; Kressig et al., 2001) found the Activities-Specific Balance Confidence Scale (ABC), a measure of balance confidence for older adults, to be an important predictor of falls in older adults in addition to being associated with changes in physical measures of balance performance.

Interventions using a multifactorial approach discovered improvements in both FOF and balance confidence. In a meta-analysis of intervention studies aimed at reducing FOF, Jung, Lee, and Lee (2009) reported interventions that address the psychological and cognitive aspects of FOF may be more effective than interventions of exercise alone. Huang, Yang, and Liu (2011) demonstrated community-dwelling older adults who received cognitive-behavioral intervention and Tai Chi exercise had significantly higher mean balance-confidence scores at a 5-month follow-up than those who received the cognitive-behavioral intervention alone and no intervention ($F = 9.10, p < .001$). Brouwer, Walker, Rydahl, and Culham (2003) concluded that FOF programs utilizing combined physical and education programs would be the most logical approach for making physical and mental health gains.

A Matter of Balance: Managing Concerns about Falls (MOB) is an evidence-based program designed to decrease FOF and improve activity levels among older adults (What is a Matter of Balance, n. d.). Over the course of 8 weekly 2-h sessions, participants engage in group discussion to facilitate cognitive restructuring regarding FOF and identification and modification of risk factors for falls (Tennstedt et al., 1998). Low-intensity group exercise addressing strength, flexibility, and balance are included in weeks 3 through 8. Several researchers (Batra, Melchior, Seff, Frederick, & Palmer, 2012; Healy et al., 2008; Ory et al., 2010; Tennstedt et al., 1998; Ullmann, Williams, & Plass, 2012; Zijlstra et al., 2009) investigated and demonstrated the efficacy of MOB in helping participants meet program goals. However, no investigation has been conducted to determine the effect of MOB on balance confidence in older adults using the ABC. Investigating the influence of MOB on balance confidence in older adult participants may improve our understanding of the role MOB plays in reducing fall risk.

The current study serves to determine the effect of MOB on balance confidence in older adults as measured by the ABC (Powell & Myers, 1995). We hypothesized that the balance confidence of older adult MOB participants would improve as a result of program participation. This study represents the initial phase of an ongoing examination of the influence of MOB on balance confidence, as measured by the ABC, among community-dwelling older adults.

Methods

Research Design

A quasiexperimental, one-group pretest-posttest study design was used to determine the effect of MOB on balance confidence in older, community-dwelling adults.

Participants

Participants were recruited from four independent living communities, nine community centers, and one federally qualified community health center in a large, metropolitan area in Southwestern United States. Notices about the MOB were placed in posted advertisements and a schedule of events at each of the facilities. Inclusion criteria were community-dwelling older adults and first-time attendees of MOB. Exclusion criteria were individuals who had previously participated in the MOB program. Age was neither an inclusion nor an exclusion criterion. The research proposal was approved by the sponsoring university's institutional review board.

Table 1. Participant characteristics

Characteristic	No. (%)
Age, years ($n = 31$)	74.3 \pm 8.5 ^a
Sex, ($n = 31$)	
Female	23 (71.9%)
Males	9 (28.1%)
Race ($n = 30$)	
African-American/Black	1 (3.3%)
Caucasian/White	24 (80.0%)
Native American	5 (16.7%)
Falls history ^b	
One in past year ($n = 33$)	16 (48.5%)
2 or more in past year ($n = 32$)	11 (33.3%)
Health insurance status ^c	
Medicare ($n = 27$)	27 (100%)
Medicaid ($n = 12$)	4 (33.3%)
Private ($n = 18$)	16 (88.9%)
Household status ($n = 32$)	
Live alone	11 (34.4%)
Live with one	15 (46.9%)
Live with more than one	6 (18.8%)

Note. Participants did not respond to all demographic questions. The number of respondents for each demographic question is provided as $n =$. ^aAge is reported as mean \pm standard deviation. ^bRepresents the number and percent of participants who responded "Yes" to having one fall or two or more falls in the past 12 months. ^cRepresents the number and percent of participants who responded "Yes" to having the type of health insurance.

A group of 128 older adults participated in the MOB program, 13 of whom had reported previous MOB program participation and 45 failed to respond to this question. Furthermore, ABC scale score data were incomplete and/or invalid for 37 participants, so that the data from 95 participants were excluded from our analyses. Of the remaining participants ($N = 33$), the majority were female (72%) and ranged in age from 54 to 87 years (74.3 ± 8.5 , $n = 31$). All demographic and background information is summarized in Table 1. Sixteen (48.5%) participants reported a single fall in the past 12 months, and 11 (34.4%) had experienced two or more falls in the past 12 months. Participant adherence rate for MOB attendance was 87.5% (Mdn = 7; [Min = 5, Max = 8, IQR = 1] sessions).

Assessments

Participants completed several surveys routine to the MOB program, including the Physical-Activity Readiness Questionnaire (PAR-Q) (Canadian Society for Exercise Physiology, 1994), first and last session surveys, and a class evaluation. Additionally, participants completed the ABC and responded to two fall history questions: (1) Have you had a fall in the past 12 months? (2) Have you had two or more falls in the past 12 months? Participants also responded to a screening question to determine previous MOB program participation.

The PAR-Q was completed to determine the preparation of participants for the low-level physical activity component of MOB. Per MOB guidelines, participants were encouraged to obtain physician consent before performing MOB exercises, if deemed necessary by their PAR-Q responses. The first session survey included questions regarding participant background information (i.e., age, number of people living in the household, sex, and race and ethnicity) and questions related to falls management, falls self-efficacy, falls control, and exercise behavior (Healy et al., 2008). The last session survey included the same questions as the first session survey, excluding the background questions. The class evaluation included questions to assist the MOB program with quality assurance and improvement, e.g., organization of the classes, preparation of the class leaders, and value of the participant workbook. Data from these surveys, except for the participant background data, are not presented in this manuscript.

The ABC is a 16-item scale designed to assess perception of balance confidence in higher-functioning older adults (Powell & Myers, 1995). Participants were asked to rate their level of confidence from 0% to 100% for 16 activities of daily living, such as getting into and out of a car, walking around the house, and sweeping the floor. Scores were averaged to generate a total score (Myers, Fletcher, Myers, & Sherk, 1998; Talley, Wyman, & Gross, 2008). Psychometric and evaluative properties of the ABC have been examined extensively, and studies have dem-

onstrated the validity, reliability, and internal consistency of the scale in older adults (Huang & Wang, 2009; Powell & Myers, 1995), including those of varied “functional mobility” (Myers et al., 1998).

Participants completed the PAR-Q, first session survey (including demographic information), the ABC, the two fall history questions, and the screening question at the beginning of the first session of the MOB program. The last session survey, class evaluation, and the ABC were completed at the end of the last session of the MOB program. All surveys were administered by MOB-trained health professions students at each respective MOB program delivery site.

MOB Program

Participants attended an 8-week MOB program, which is an evidence-based program designed to reduce FOF and improve activity levels of older adults at risk for falls (What is a Matter of Balance, n. d.). Classes were scheduled 1 day per week for 2-h sessions. Health professions graduate student pairs (i.e., occupational therapy, physical therapy, athletic training) delivered the program to study participants as part of a falls outreach program at the sponsoring university. Students were trained to deliver the program according to MOB program guidelines.

The MOB program has been described above and in the literature (Healy et al., 2008; Tennstedt et al., 1998). Efficacy of the program when delivered by volunteer lay leaders has previously been established (Tennstedt et al., 1998).

Statistical Analyses

The data were analyzed using SPSS for Microsoft Windows, version 22 (IBM, Armonk, NY). Descriptive statistics were calculated for all demographic variables (i.e., age, sex, race) including mean (*SD*) and number (%), as appropriate. Means and standard deviations were calculated for the ABC scores. The Shapiro-Wilk test for normality was performed for all continuous variables (i.e., age, ABC scores). Because the outcomes data was not normally distributed, the Wilcoxon signed-rank test was conducted to determine if a difference existed between pre- and postprogram ABC scores (individual and total scores). Significance was set at $p < .05$, 2-tailed.

Results

Balance confidence findings are summarized in Table 2. The mean total score for the ABC for participants in the current study was 77.7 ($SD = 20.0$) preprogram and 83.8 ($SD = 13.7$) postprogram. Significant differences between pre- and postprogram were found for 3 of the 16

Table 2. Pre- and postprogram Activities-Specific Balance Confidence Scale (ABC) scores

ABC Item	Pre	Post	<i>p</i> -value
... walk around the house?	89 (19)	95 (8)	.07
... walk up or down stairs?	76 (26)	83 (19)	.10
... bend over and pick up a slipper from the front of a closet floor?	83 (26)	91 (12)	.08
... reach for small can off a shelf at eye level?	90 (23)	98 (6)	.006
... stand on your tiptoes and reach for something above your head?	77 (30)	83 (24)	.25
... stand on a chair and reach for something?	48 (41)	55 (41)	.18
... sweep the floor?	91 (21)	97 (9)	.07
... walk outside the house to a car parked in the driveway?	92 (17)	97 (7)	.028
... get into or out of a car?	92 (17)	95 (11)	.60
... walk across a parking lot to the mall?	85 (26)	92 (13)	.09
... walk up or down a ramp?	87 (21)	89 (13)	.60
... walk in a crowded mall where people rapidly walk past you?	83 (25)	88 (16)	.66
... are bumped into by people as you walk through the mall?	76 (31)	82 (18)	.46
... step onto or off an escalator while you are holding onto a railing?	79 (27)	82 (25)	.51
... step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing?	61 (34)	64 (38)	.46
... walk outside on icy sidewalks?	37 (34)	48 (38)	.009
Total ABC score	77.7 (20.0)	83.8 (13.7)	.024

Note. Outcomes are reported as mean (*SD*).

ABC items, including reach for a small can off a shelf at eye level (pre $M = 90$, $SD = 23$; post $M = 98$, $SD = 6$, $p = .006$), walk outside the house to a car parked in the driveway (pre $M = 92$, $SD = 17$; post $M = 97$, $SD = 7$, $p = .028$), and walk outside on icy sidewalks (pre $M = 37$, $SD = 34$; post $M = 48$, $SD = 38$, $p = .009$). Additionally, significant differences were found for total ABC scores (pre $M = 77.7$, $SD = 20.0$; post $M = 83.8$, $SD = 13.7$, $p = .024$).

Discussion

As hypothesized, participation in the MOB program significantly improved balance confidence among community-dwelling older adults. These findings are similar to findings of previous studies that showed improved ratings of falls self-efficacy following participation in the MOB program (Healy et al., 2008; Tennstedt et al., 1998; Zijlstra et al., 2009). The use of the ABC in the current study differs from balance confidence measures used in previous studies of the MOB. Healy et al. (2008) and Tennstedt et al. (1998) used a modified 12-item version of the original Falls Efficacy Scale (FES) (Tinetti et al., 1990) to assess change in FOF. Zijlstra et al. (2009) used a modified 14-item version of the FES (Hill, Schwarz, Kalogeropoulos, & Gibson, 1996) to measure concerns about falling. While the FES is suitable for frail, homebound elders (Myers et al., 1998), the ABC was designed to assess balance confidence when performing more difficult activities, and is more appropriate for community-

dwelling older adults with various levels of function (Powell & Myers, 1995). The participants in this study were capable of engaging in an 8-week community-based program, therefore, the ABC was more suitable than the FES for assessing balance confidence in our sample.

The ABC was one of the psychological outcome measures used by Freiburger, Häberle, Spirduso, and Zijlstra (2012), who investigated the effects of three types of strength and balance exercise interventions on physical performance, fall-related psychological outcomes, and incidence of falls in older adults with a fall history or a history of FOF. One of the exercise intervention groups in that study included a fall-risk education portion with elements of the MOB program. The authors reported that, although physical performance outcome scores were higher for the intervention groups, none of the groups differed significantly on fall-related psychological outcomes compared with the control group. One explanation for this lack of improvement in balance confidence following fall risk education was that only certain elements of the MOB were included (Freiburger et al., 2012). The findings of the current study support the use of the ABC for measuring change in balance confidence when participating in the full MOB program.

The mean total ABC scores for participants pre- and postintervention were 77.7 and close to 84, respectively. Meyers et al. (1998) concluded individuals with ABC scores less than 80 are likely to show improvements in balance confidence – and even more so for those scoring less than 70. Significant improvement ($p = .024$) in balance confidence of participants in the current study as a result of the MOB program is in line with the Meyers et

al.'s (1998) conclusions. Lajoie and Gallagher (2004) reported that lower scores (mean score of 48) on the ABC were associated with individuals with a fall history. Almost half of our study participants reported falling once in the past 12 months, and a third reported having two or more falls in the previous 12 months, yet the mean baseline ABC score suggests that our participants, despite their fall history, had higher balance confidence levels than expected based on results from previous studies (Lajoie & Gallagher, 2004; Myers et al., 1998). Further research is warranted to examine the influence of and association with fall history on balance confidence as measured by the ABC.

There were a number of limitations in this study. We did not include a control group in our study design, so the ability to detect a cause and effect relationship between MOB program participation and changes in balance confidence is limited. Although the ABC has demonstrated validity and reliability, completing the ABC preintervention may have led to artificially inflated ABC scores post-intervention because participants became familiar with the survey. Third, a substantial amount of data was excluded from analysis because of incomplete and/or invalid responses to the ABC, our primary outcome measure. Furthermore, the sample size was small and homogeneous (e.g., primarily female, Caucasian, and from the same geographical location), limiting the generalizability of our findings. These last two limitations will be addressed in the subsequent phase(s) of this research with the ongoing collection of ABC data from MOB participants enrolled as part of the sponsoring institution's falls prevention program.

Further research is needed to determine the influence of the MOB program on balance in older adults. A randomized, controlled trial with a large, diverse sample using objective measures of balance would provide the most accurate assessment of the efficacy of the MOB program for improving balance. Although we found the MOB was associated with improved scores on the ABC, recent studies of interventions for reducing FOF have included both a self-efficacy measure and a FOF measure (Huang et al., 2011; Jung et al., 2009; Zijlstra et al., 2009). Self-efficacy plays a role in FOF, but they are different constructs, and differences between self-efficacy and FOF should be considered when looking at interventions for reducing FOF (Legters, 2002). Including a FOF measure, such as the Survey of Activities and Fear of Falling in the Elderly (Lachman et al., 1998), in addition to a balance-confidence measure may strengthen future studies on the effectiveness of the MOB program for reducing FOF. The efficacy of using a "booster session" as recommended by Tennstedt et al. (1998) and implemented by Zijlstra, Tennstedt, van Haastregt, van Eijk, and Kempen (2006) and Zijlstra et al. (2009) should also be examined in future studies. Finally, longitudinal research designs should be used to assess the sustainability of improved outcomes and the long-term effect on falls incidence.

Conclusions

In this initial phase study, we found balance confidence, as measured by the ABC, improved in community-dwelling older adults who participated in the MOB program. These findings support previous reports investigating the impact of the MOB for increasing balance confidence through an approach that combines education and exercise.

Declaration of Conflicts of Interest

The authors declare that no conflicts of interest exist. This work was previously presented as a poster at the 2014 American Society on Aging conference in San Diego, California, in March 2014.

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