

ORIGINAL ARTICLE

## Effect of a Matter of Balance programme on avoidance behaviour due to fear of falling in older adults

Cecelia SARTOR-GLITTENBERG <sup>1</sup>, Elton BORDENAVE,<sup>2</sup> Curt BAY,<sup>3</sup> Lori BORDENAVE<sup>1</sup> and Jeffrey L. ALEXANDER<sup>4</sup>

<sup>1</sup>Physical Therapy Department, Arizona School of Health Sciences, <sup>2</sup>Audiology Department, Arizona School of Health Sciences, and A.T. Still University Center for Resilience in Aging, <sup>3</sup>Interdisciplinary Health Sciences, Arizona School of Health Sciences and <sup>4</sup>Doctor of Health Sciences Program, College of Graduate Health Studies and A.T. Still University Center for Resilience in Aging, A.T. Still University, Mesa, Arizona, USA

*Correspondence:* Dr Cecelia Sartor-Glittenberg PT PhD, Physical Therapy Department, Arizona School of Health Sciences, A.T. Still University, 5850 E. Still Circle, Mesa, AZ 85206, USA. Email: cglittenberg@atsu.edu

*Disclosure:* The authors have no potential conflicts of interest to disclose.

*Received 23 May 2017; revision received 3 August 2017; accepted 23 October 2017.*

### Abstract

**Background:** Fear of falling (FOF) is associated with restricted activities, increased risk of falling, and decreased quality of life. A Matter of Balance (AMOB) is an evidence-based programme designed to decrease FOF. The current study investigated the influence of the AMOB on activity avoidance caused by FOF in older adults using the Fear of Falling Avoidance Behavior Questionnaire (FFABQ), health-related quality of life, and a question regarding concerns about falling.

**Methods:** Participants of this quasi-experimental, one-group, pretest–post-test study design were older adults from community sites in the Phoenix, Arizona, metropolitan area. Participants attended the AMOB programme, which consisted of one weekly 2-h session for 8 weeks. At the beginning and end of the programme, participants completed the standard AMOB assessments, the FFABQ, the Centers for Disease Control Core Healthy Days Measure (CDC HRQOL-4), and a question regarding concerns about falling.

**Results:** Sixty-three participants completed the study; their mean  $\pm$  SD age was  $75.3 \pm 7.1$  years (range: 60.0–90.0 years), and 84.1% were women. The FFABQ scores decreased from baseline ( $24.4 \pm 12.7$  points) to post-AMOB ( $20.1 \pm 11.9$  points;  $t = 2.62$ ,  $P = 0.01$ ). No changes in any of the CDC HRQOL-4 questions were noted (CDC HRQOL-4 question (Q1) ( $z = -1.41$ ,  $P = 0.16$ ), CDC HRQOL-4 Q2 and Q3 summary index ( $z = -1.60$ ,  $P = 0.11$ ), and CDC HRQOL-4 Q4 ( $z = -0.97$ ,  $P = 0.33$ )). Concerns about falling decreased from baseline ( $3.4 \pm 0.9$  points) to post-AMOB ( $2.8 \pm 0.8$  points;  $z = -4.09$ ,  $P < 0.001$ ).

**Conclusion:** Avoidance behaviour caused by FOF, as measured by the FFABQ, and concerns about falling decreased in community-dwelling older adults who participated in the AMOB. Findings support the efficacy of the AMOB for reducing both avoidance behaviour caused by FOF and concerns about falling through an approach that combines education and exercise.

**Key words:** falls, fear, geriatrics, postural balance.

### INTRODUCTION

Older adults who fall may develop a fear of falling (FOF) that results in a restriction of activities vital to their physical well-being. The reported prevalence of FOF is between 20.8% and 85% for community-dwelling older adults.<sup>1</sup> While FOF often occurs as the result of a fall, it can also occur in the absence of an actual fall.<sup>1</sup> In addition to other consequences, FOF can impact quality of

life (QOL) in older adults. Arfken *et al.* found increased levels of fear were associated with decreased self-rated QOL measures.<sup>2</sup> In other studies, individuals reporting FOF scored lower on the mental health index component of the 36-item Short Form Health Survey, a health-related quality of life (HRQOL) measure.<sup>3,4</sup>

Conversely, poor health status can lead to FOF. In addition to FOF leading to lower self-reported health

status, lower self-reported health status can lead to FOF.<sup>1,4,5</sup> Howland *et al.* found that individuals with fair or poor self-rated health status were five times more likely to report FOF.<sup>4</sup> In another study, fair or poor self-rated health status increased the odds of developing FOF over time.<sup>5</sup>

Almost 56% of older adults expressing FOF also reported activity reduction because of this fear.<sup>4,6</sup> Studies investigating the predictive value of FOF for activity limitations found a positive relationship.<sup>7-9</sup> The severity of fear also appears to affect the likelihood of activity restrictions.<sup>8</sup> Restricting high-risk activities, such as climbing on the roof, may seem sensible for many older adults, but activity limitations can lead to disability. Using the Survey of Activities and Fear of Falling in the Elderly questionnaire to measure activity limitations, Deshpande *et al.* found that individuals reporting severe activity limitations required assistance with activities of daily living (e.g. grooming, bathing, dressing) and instrumental activities of daily living (e.g. shopping, preparing meals, doing light housework).<sup>10</sup> Although this relationship was not significant for those with moderate activity limitations, greater activity limitations led to increased need for assistance with activities of daily living and instrumental activities of daily living.<sup>10</sup>

A Matter of Balance: Managing Concerns about Falls (AMOB) is an evidence-based programme for older adults that focuses on teaching cognitive behavioural strategies for managing fear related to falling and subsequent activity restrictions.<sup>11</sup> Several studies have reported participant outcomes associated with implementation of the AMOB programme.<sup>12-19</sup> Results indicated a positive impact on FOF,<sup>12</sup> activity avoidance/restriction,<sup>12,13,16</sup> falls self-efficacy,<sup>12,16,17</sup> balance confidence,<sup>18</sup> and functional measures.<sup>14,15</sup> The effect of the AMOB on QOL or HRQOL has not been extensively studied, however. Based on their Health Interference Scale, Ory *et al.* found that participants made significant improvements in the degree to which health interfered with daily activities.<sup>19</sup> Tennstedt *et al.*,<sup>16</sup> using the Sickness Impact Profile (SIP) to measure changes in behaviour due to health problems, found small but not clinically meaningful improvements after the AMOB programme.

None of these studies examined activity restrictions due to FOF using the Fear of Falling Avoidance Behavior Questionnaire (FFABQ),<sup>20</sup> a recently developed, validated outcome measure. Therefore, the

purpose of the current study was to determine the influence of AMOB on activity avoidance caused by FOF in older adults as measured by the FFABQ, the Centers for Disease Control Core Healthy Days Measure (CDC HRQOL-4),<sup>21,22</sup> and a question regarding concerns about falling. Using the FFABQ, we also investigated the potential moderating effects of the number of sessions attended, fall history, and exercise activity on change.

## METHODS

We employed a quasi-experimental, one-group, pretest-post-test study design. The A.T. Still University Still Standing Falls Prevention Outreach Program is a community service learning experience sponsored by A.T. Still University's Aging Studies Project. As part of the programme, trained, graduate health professions students deliver the evidence-based falls prevention AMOB programme to community-dwelling older adults. Details related to the AMOB, which consists of one weekly 2-h session for 8 weeks, and delivery by graduate health professions students have been described previously.<sup>16,18,23</sup> The study protocol was approved by the university's institutional review board.

## Participants

Community participants of the Still Standing Falls Prevention Outreach Program were recruited during the winters of 2014 and 2015 from 4 independent living communities, 14 community centres, and 8 other community sites serving older adults in the Phoenix, Arizona, metropolitan area. Data from previous participants in the AMOB were excluded from analysis. There were no other inclusion or exclusion criteria. The rights of the participants were protected throughout the study. Participants read and signed informed consent forms prior to completion of research-related measurement tools.

## Measurements

At the first AMOB session (baseline), participants completed the following: (i) Physical Activity Readiness Questionnaire<sup>24</sup>; (ii) a survey regarding demographic information (age, sex); (iii) a screening question to determine previous AMOB programme participation; (iv) FFABQ; (v) CDC HRQOL-4; (vi) a question regarding concerns about falling question<sup>13</sup>;

(vii) two questions about fall history; and (viii) a question about exercise activity. The fall history questions asked participants if they had a fall in the past 12 months or two or more falls in the past 12 months.<sup>25</sup> The exercise activity question asked participants how many days per week in the past 3 months they had typically exercised for 30 min or more. Response categories for exercise activity included not any time (1 point), less than once a week (2 points), once or twice a week (3 points), more than two times a week but not every day (4 points), every day but not all the time (5 points), and every day all the time (6 points).

The FFABQ is a self-administered, 14-item measure of avoidance behaviour caused by FOF; it uses a 0–4-point Likert-type scale and has a maximum score of 56 points, with higher scores indicating higher avoidance behaviour.<sup>20</sup> The questionnaire has demonstrated test–retest reliability (intra-class correlation coefficient = 0.812), is able to discriminate between fallers and non-fallers, and has shown convergent validity with other measures of balance confidence (e.g. Activities-specific Balance Confidence Scale) and activity (e.g. 6-minute walk test).<sup>20</sup>

The CDC HRQOL-4 is a widely used measure of HRQOL.<sup>21,22</sup> The first question asks respondents to rate their perception of general health on a 5-point scale (excellent, 1 point; very good, 2 points; good, 3 points; fair, 4 points; and poor, 5 points). For questions 2 and 3, respondents report the number of days in the past 30 days that physical and mental health was not good. For the last question, participants report the number of days that poor physical or mental health inhibited usual activities. A summary index of unhealthy days is calculated by adding responses to questions 2 and 3, for a maximum response of 30 days.<sup>22,26</sup> The validity and reliability of the CDC HRQOL-4 have been well-established.<sup>22,27–30</sup>

To assess FOF, participants were asked a question regarding their concerns about falling: ‘Are you concerned about falling?’ Response options were never (1 point), almost never (2 points), sometimes (3 points), often (4 points), or very often (5 points).<sup>13,31</sup>

The FFABQ, CDC HRQOL-4, concerns about falling question, and exercise question were also completed at the end of session 8 (post-AMOB). Class attendance was taken at each AMOB session. All surveys were administered by AMOB-trained health professions students at each AMOB programme delivery site.

## Data analysis

Descriptive statistics were calculated for all variables as either means  $\pm$  SD or counts and percentages, as appropriate. A dependent-samples *t*-test was used to assess change in total FFABQ from baseline to post-AMOB. Repeated measures ANOVA were used to assess the potential moderating effects (interaction term) of the number of sessions attended, fall history at baseline, and exercise level at baseline on change in FFABQ. Wilcoxon signed ranks tests were conducted to assess changes between baseline and post-AMOB scores for the CDC HRQOL-4, concerns about falling, and exercise activity. Spearman’s correlation coefficients were calculated between FFABQ and concerns about falling. An  $\alpha$  of 0.05, two-tailed, was adopted as the criterion for statistical significance. SPSS version 23 (IBM, Armonk, NY, USA) was used for the analyses.

## RESULTS

Baseline and post-AMOB data for the FFABQ were available for 63 participants. The mean  $\pm$  SD age of participants was  $75.3 \pm 7.1$  years (range: 60.0–90.0 years), and 84.1% were women. Several participants failed to complete the CDC HRQOL-4 (as many as 13) at baseline or at baseline and post-AMOB. The number of participants responding to each survey is presented in Table 1.

Mean  $\pm$  SD FFABQ scores decreased from baseline ( $24.4 \pm 12.7$  points) to post-AMOB ( $20.1 \pm 11.9$  points;  $t = 2.62$ ,  $P = 0.01$ ) (Table 1). No changes were noted in the CDC HRQOL-4 from baseline to post-AMOB (CDC HRQOL-4 question (Q)1 ( $z = -1.41$ ,  $P = 0.16$ ), CDC HRQOL-4 Q2 and Q3 summary index ( $z = -1.60$ ,  $P = 0.11$ ), and CDC HRQOL-4 Q4 ( $z = -0.97$ ,  $P = 0.33$ )).

The mean  $\pm$  SD concerns about falling score decreased from baseline ( $3.4 \pm 0.9$  points) to post-AMOB ( $2.8 \pm 0.8$  points;  $z = -4.09$ ,  $P < 0.001$ ) (Table 1). The correlation between baseline FFABQ and baseline concerns about falling was modest at baseline ( $r_s = 0.25$ ,  $P = 0.04$ ) and not significant post-AMOB ( $r_s = 0.10$ ,  $P = 0.46$ ).

The mean  $\pm$  SD number of AMOB sessions attended by participants was  $6.4 \pm 2.0$ . The number of sessions attended failed to moderate change in FFABQ ( $F$  [interaction term] = 1.16,  $P = 0.28$ ). At baseline, 29 participants (46.0%) reported no falls,

**Table 1** Means  $\pm$  SD and *P*-values for surveys used to determine the effect of A Matter of Balance programme on avoidance behaviour due to fear of falling in older adults

Tests and measures <sup>†</sup>	<i>n</i>	Mean $\pm$ SD		<i>P</i> -value
		Baseline	Post-AMOB	
FFABQ (total)	63	24.4 $\pm$ 12.7	20.1 $\pm$ 11.9	0.01
CDC HRQOL-4 Q1 (1–5 points)	57	2.9 $\pm$ 0.7	2.8 $\pm$ 0.9	0.16
CDC HRQOL-4 Q2 (physically unhealthy days 0–30)	52	3.2 $\pm$ 6.4	3.2 $\pm$ 6.4	0.64
CDC HRQOL-4 Q3 (mentally unhealthy days 0–30)	52	2.7 $\pm$ 6.1	2.5 $\pm$ 6.2	0.26
CDC HRQOL-4 Q4 (activity limitation days 0–30)	55	1.7 $\pm$ 3.7	2.2 $\pm$ 6.0	0.33
CDC HRQOL-4 Q2 and Q3 summary index (physically and mentally unhealthy days 0–30)	51	6.0 $\pm$ 8.6	5.2 $\pm$ 8.5	0.11
Concerns about falling	63	3.4 $\pm$ 0.9	2.8 $\pm$ 0.8	<0.001
Exercise activity	63	3.4 $\pm$ 1.4	3.9 $\pm$ 1.1	0.001

<sup>†</sup> The FFABQ has a possible total of 0–56 points; the concerns about falling question has a possible 0–5 points; and the exercise activity question has a possible 0–5 points. AMOB, A Matter of Balance: Managing Concerns about Falls; CDC HRQOL-4, Centers for Disease Control Core Healthy Days Measure; FFABQ, Fear of Falling Avoidance Behavior Questionnaire; Q, question.

19 (30.2%) reported falling once, and 15 (23.8%) reported falling two or more times in the past 12 months. Fall history failed to moderate change in FFABQ ( $F$  [interaction term] = 0.82,  $P$  = 0.37). Participants reported a mean  $\pm$  SD increase in exercise activity from baseline (3.4  $\pm$  1.4 points) to post-AMOB (3.9  $\pm$  1.1 points;  $z$  = -3.29,  $P$  = 0.001) (Table 1). Exercise activity reported at baseline failed to moderate change in FFABQ ( $F$  [interaction term] = 0.50,  $P$  = 0.48).

## DISCUSSION

The primary purpose of the current study was to examine the influence of AMOB on FFABQ, HRQOL, and FOF in older adults. We found avoidance behaviour caused by FOF, as measured by the FFABQ, and FOF were reduced in AMOB programme participants. Our findings were consistent with previous studies reporting improvements in balance confidence and falls self-efficacy after participating in the AMOB.<sup>12,13,16,18,23</sup> To our knowledge, the current study was the first to show that participation in the AMOB may lead to a reduction in FOF avoidance behaviour as measured by the FFABQ. Although we found significant improvement in FFABQ scores, the mean 4.3-point improvement did not meet the minimal detectable change score of 15 points reported by Landers *et al.*<sup>20</sup> A possible explanation may be differences in our study population compared with that of Landers *et al.*<sup>20</sup> For instance, Landers *et al.* included individuals with known neurologic conditions as well as healthy older adults<sup>20</sup>; we included community-dwelling older adults without regard to

presence of neurologic conditions. In Landers *et al.*,<sup>20</sup> 39.7% of participants reported falling. In the current study, 54.0% reported a history of falls.

Greater changes in fear avoidance behaviours caused by FOF have been reported in longer studies. Using an activity avoidance measure—‘Do you avoid certain activities due to concerns about falls?’ (1 = never, 5 = very often)—Zijlstra *et al.* found improvements in activity avoidance at 4-month follow-up but not immediately after their 8-week programme,<sup>12</sup> which suggested that the beneficial effects of AMOB may occur over a longer period. Other modifications to the AMOB programme may result in a greater reduction in fear avoidance behaviour. In a different study, Zijlstra *et al.* suggested a programme of longer duration.<sup>13</sup> A booster session 2–6 months after the programme ends was recommended by Tennstedt *et al.* and implemented in several studies.<sup>12,13,16,32</sup> Ultimately, greater improvement in fear avoidance behaviour may accrue by extending the length of the AMOB programme or by collecting follow-up FFABQ data over time.

We did not find a change in the CDC HRQOL-4 after participation in the AMOB. For Q1 (related to perception of general health), participants rated their general health between very good to good at baseline and post-AMOB. It is unlikely this perception would improve significantly in an 8-week period. Learmonth *et al.* reported that QOL (Satisfaction with Life Scale) and HRQOL (12-item Short Form Health Survey) in older women were stable from baseline to 1 year.<sup>33</sup> For Q2 and Q3 of the CDC HRQOL-4 (number of days in past 30 days physical and mental health was not good), our findings were similar to

those of Tennstedt *et al.*,<sup>16</sup> who used the SIP to measure change in behaviour due to health problems. In that study,<sup>16</sup> the SIP was administered at baseline, 1–2 weeks post-AMOB, 6 months post-AMOB, and 12 months post-AMOB. For individuals attending at least five AMOB sessions, significant changes were found at 1–2 weeks post-AMOB in the SIP mobility control subscale score and at 12 months in the total SIP score, SIP physical dimension score, mobility range subscale score, and social behaviour subscale score. However, the authors stated that mean change scores were so small that they probably did not represent a clinically meaningful change.<sup>16</sup> Similarly, Smith *et al.* used Q2 and Q4 of the CDC HRQOL-4 to measure HRQOL and found no significant change in scores from baseline to post-AMOB.<sup>17</sup>

In the current study, concerns about falling were modestly correlated with fear avoidance behaviour at baseline but not at post-AMOB. This finding is inconsistent with the findings of Zijlstra *et al.*,<sup>31</sup> who found a relationship between concerns about falling and self-reported fear avoidance behaviour in older adults. One explanation is that we used the FFABQ to measure fear avoidance behaviour, while Zijlstra *et al.* used a single question to gauge avoidance behaviour.<sup>31</sup> Furthermore, the current study used the concerns about falling question to measure FOF and the FFABQ to measure avoidance behaviour caused by FOF.<sup>20,31,34</sup> Because FOF is multifactorial and the FFABQ is thought to measure avoidance behaviour from fear rather than fear itself,<sup>20,35</sup> a strong correlation between fall concerns and avoidance behaviour is not expected. Landers *et al.* suggested that FOF is a unique construct,<sup>36</sup> so concerns about falling may be different from avoidance behaviour as a consequence of FOF. Our findings support the use of a question regarding concerns about falling in addition to the FFABQ when examining the effectiveness of the AMOB on reducing FOF.

Results of the current study showed that the number of AMOB sessions attended did not moderate change in FFABQ. This finding was inconsistent with reports that attending five or more sessions improved falls self-efficacy compared with attending fewer than five sessions.<sup>16,17</sup> Although Zijlstra *et al.* found attending five or more sessions had additional intervention effects for concerns about falling and avoidance of activities at 14 months post-AMOB,<sup>13</sup> significant improvements for all AMOB participants

were found in FOF and avoidance of activity from FOF immediately post-AMOB at 8 weeks and at 8-month follow-up. Zijlstra *et al.* noted a possible explanation for these results could be that the Dutch version of the AMOB includes a booster session.<sup>13</sup>

Baseline fall history did not moderate change in FFABQ. Despite evidence of an association between FOF and avoidance of activities in persons with a history of multiple falls,<sup>31</sup> Scheffer *et al.* found up to 50% of those reporting FOF had no history of falls.<sup>1</sup> The literature also suggests decreased falls self-efficacy, decreased activity caused by FOF,<sup>37</sup> and avoidance behaviour from FOF in those without a history of falls.<sup>4</sup> Given FOF exists in individuals who have and have not fallen, a history of falls would not be expected to influence changes in fear-related avoidance behaviours, which is consistent with the current study.

Baseline exercise activity did not moderate change in FFABQ. To our knowledge, the current study was the first to examine the influence of baseline exercise activity on AMOB outcomes. Studies have collected data for baseline exercise or activity level,<sup>14,17</sup> but they did not analyze the influence of baseline level on FOF-related AMOB outcomes. Our finding suggests that both those who currently exercise and those who do not may benefit from participation in the AMOB.

Participants in the current study reported an increase in exercise behaviour post-AMOB. This finding is similar to that of Smith *et al.*,<sup>17</sup> who reported an increase in the number of days participants were physically active post-AMOB. Because exercise is part of the multicomponent AMOB programme, exercising at the AMOB sessions may explain the increase in exercise activity.

Our study had several limitations. The study design limited our ability to determine a causal effect of the AMOB. Study participants were recruited from a single geographical location, and the majority of participants were women, limiting the generalizability of study findings. We did not report on other factors that may influence FOF, such as comorbidities,<sup>3,6</sup> use of walking aids,<sup>4</sup> balance impairment,<sup>2,8</sup> and the presence of dizziness.<sup>4</sup> Although these factors may affect FOF, it was not our intent to evaluate their influence in this study. We did not measure cognitive status in our participants. Our intent was to generalize to the population of community-dwelling adults, so we did not specifically screen for cognitive

impairments. Self-reported measures were used, which are subject to bias.<sup>38</sup> Lastly, an a priori power analysis was not conducted.

Future studies should use a true experimental design for diversity and random assignment of participants to intervention (AMOB) and control groups. Although previous studies suggested that participants need to attend at least five sessions for the benefits of AMOB,<sup>16,17</sup> our findings did not support this. Therefore, the number of sessions needed to achieve measurable outcomes of the programme should be further investigated. Additional investigation is also warranted to determine the potential benefits of complementary or follow-up programming on AMOB outcomes. Future studies should establish the minimal detectable change for the FFABQ for community-dwelling older adults without neurologic conditions, and exploration of the long-term impact of the AMOB programme should be considered.

Results of the current study suggested that there is value in evidence-based programming like the AMOB because of its ability to reduce avoidance behaviour caused by FOF, reduce concerns about falling, and increase physical activity.

## ACKNOWLEDGMENTS

The authors thank Deborah Goggin, Scientific Writer, in Research Support at A.T. Still University for her editorial assistance.

## REFERENCES

- Scheffer AC, Schuurmans MJ, van Dijk N, van der Hooft T, de Rooij SE. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. *Age Ageing* 2008; **37**: 19–24.
- Arfken CL, Lach HW, Birge SJ, Miller JP. The prevalence and correlates of fear of falling in elderly persons living in the community. *Am J Public Health* 1994; **84**: 565–570.
- Chang NT, Chi LY, Yang NP, Chou P. The impact of falls and fear of falling on health-related quality of life in Taiwanese elderly. *J Community Health Nurs* 2010; **27**: 84–95.
- Howland J, Lachman ME, Peterson EW, Cote J, Kasten L, Jette A. Covariates of fear of falling and associated activity curtailment. *Gerontologist* 1998; **38**: 549–555.
- Lach HW. Incidence and risk factors for developing fear of falling in older adults. *Public Health Nurs* 2005; **22**: 45–52.
- Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *J Am Geriatr Soc* 2002; **50**: 1329–1335.
- Li F, Fisher KJ, Harmer P, McAuley E. Falls self-efficacy as a mediator of fear of falling in an exercise intervention for older adults. *J Gerontol B Psychol Sci Soc Sci* 2005; **60**: P34–P40.
- Li F, Fisher KJ, Harmer P, McAuley E, Wilson NL. Fear of falling in elderly persons: association with falls, functional ability, and quality of life. *J Gerontol B Psychol Sci Soc Sci* 2003; **58**: P283–P290.
- Bertera EM, Bertera RL. Fear of falling and activity avoidance in a national sample of older adults in the United States. *Health Soc Work* 2008; **33**: 54–62.
- Deshpande N, Metter EJ, Lauretani F, Bandinelli S, Guralnik J, Ferrucci L. Activity restriction induced by fear of falling and objective and subjective measures of physical function: a prospective cohort study. *J Am Geriatr Soc* 2008; **56**: 615–620.
- MainHealth. A Matter of Balance 2017. [Cited 1 April 2017.] Available from URL: <https://mainehealth.org/about/healthy-communities/healthy-aging/matter-of-balance>.
- Zijlstra GA, van Haastregt JC, Du Moulin MF, de Jonge MC, van der Poel A, Kempen GI. Effects of the implementation of an evidence-based program to manage concerns about falls in older adults. *Gerontologist* 2013; **53**: 839–849.
- Zijlstra GA, van Haastregt JC, Ambergen T *et al.* Effects of a multicomponent cognitive behavioral group intervention on fear of falling and activity avoidance in community-dwelling older adults: results of a randomized controlled trial. *J Am Geriatr Soc* 2009; **57**: 2020–2028.
- Chen TY, Edwards JD, Janke MC. The effects of the a matter of balance program on falls and physical risk of falls, Tampa, Florida, 2013. *Prev Chronic Dis* 2015; **12**: E157.
- Ullmann G, Williams HG, Plass CF. Dissemination of an evidence-based program to reduce fear of falling, South Carolina, 2006–2009. *Prev Chronic Dis* 2012; **9**: E103.
- Tennstedt S, Howland J, Lachman M, Peterson E, Kasten L, Jette A. A randomized, controlled trial of a group intervention to reduce fear of falling and associated activity restriction in older adults. *J Gerontol B Psychol Sci Soc Sci* 1998; **53**: P384–P392.
- Smith M, Hochhalter A, Cheng Y, Wang S, Ory M. Programmatic influences on outcomes of an evidence-based fall prevention program for older adults: a translational assessment. *Transl Behav Med* 2011; **1**: 384–393.
- Alexander J, Sartor-Glittenberg C, Bordenave E, Bordenave L. Effect of the Matter of Balance program on balance confidence in older adults. *GeroPsych* 2015; **28**: 183–189. <https://doi.org/10.1024/1662-9647/a000121>.
- Ory MG, Smith ML, Wade A, Mounce C, Wilson A, Parrish R. Implementing and disseminating an evidence-based program to prevent falls in older adults, Texas, 2007–2009. *Prev Chronic Dis* 2010; **7**: A130.
- Landers MR, Durand C, Powell DS, Dibble LE, Young DL. Development of a scale to assess avoidance behavior due to a fear of falling: the Fear of Falling Avoidance Behavior Questionnaire. *Phys Ther* 2011; **91**: 1253–1265.
- Centers for Disease Control and Prevention. Health-related quality of life (HRQOL): methods and measures 2016. [Cited October 3, 2016.] Available from URL: <http://www.cdc.gov/hrqol/methods.htm>.
- Moriarty DG, Zack MM, Kobau R. The Centers for Disease Control and Prevention's healthy days measures – population tracking of perceived physical and mental health over time. *Health Qual Life Outcomes* 2003; **1**: 37.
- Healy TC, Peng C, Haynes MS, McMahon EM, Botler JL, Gross L. The feasibility and effectiveness of translating A

- Matter of Balance into a volunteer lay leader model. *J Appl Gerontol* 2008; **27**: 34–51.
- 24 Canadian Society for Exercise Physiology. PAR-Q and You, Vol. **74**. Gloucester: Canadian Society for Exercise Physiology, 1994.
  - 25 Panel on the Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatrics Society clinical practice guideline for prevention of falls in older persons. *J Am Geriatr Soc* 2011; **59**: 148–157.
  - 26 Centers for Disease Control and Prevention. Health-related quality of life (HRQOL): frequently asked questions 2016. [Cited October 3, 2016.] Available from URL: <http://www.cdc.gov/hrqol/faqs.htm>
  - 27 Ounpuu S, Chambers LW, Chan D, Yusuf S. Validity of the US Behavioral Risk Factor Surveillance System's health related quality of life survey tool in a group of older Canadians. *Chronic Dis Can* 2001; **22**: 93–101.
  - 28 Ounpuu S, Krueger P, Vermeulen M, Chambers L. Using the U.S. Behavior Risk Factor Surveillance System's health related quality of life survey tool in a Canadian city. *Can J Public Health* 2000; **91**: 67–72.
  - 29 Andresen EM, Catlin TK, Wyrwich KW, Jackson-Thompson J. Retest reliability of surveillance questions on health related quality of life. *J Epidemiol Community Health* 2003; **57**: 339–343.
  - 30 Dominick KL, Ahern FM, Gold CH, Heller DA. Relationship of health-related quality of life to health care utilization and mortality among older adults. *Aging Clin Exp Res* 2002; **14**: 499–508.
  - 31 Zijlstra GA, van Haastregt JC, van Eijk JT, van Rossum E, Stalenhoef PA, Kempen GI. Prevalence and correlates of fear of falling, and associated avoidance of activity in the general population of community-living older people. *Age Ageing* 2007; **36**: 304–309.
  - 32 Zijlstra GA, Tennstedt SL, van Haastregt JC, van Eijk JT, Kempen GI. Reducing fear of falling and avoidance of activity in elderly persons: the development of a Dutch version of an American intervention. *Patient Educ Couns* 2006; **62**: 220–227.
  - 33 Learmonth YC, Alwick EA, McAuley E, Motl RW. Quality of life and health-related quality of life over 1 year in older women: monitoring stability and reliability of measurement. *Soc Indic Res* 2015; **123**: 267–279.
  - 34 Zijlstra GA, van Haastregt JC, van Rossum E, van Eijk JT, Yardley L, Kempen GI. Interventions to reduce fear of falling in community-living older people: a systematic review. *J Am Geriatr Soc* 2007; **55**: 603–615.
  - 35 Legters K. Fear of falling. *Phys Ther* 2002; **82**: 264–272.
  - 36 Landers MR, Oscar S, Sasaoka J, Vaughn K. Balance confidence and fear of falling avoidance behavior are most predictive of falling in older adults: prospective analysis. *Phys Ther* 2016; **96**: 433–442.
  - 37 Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol* 1994; **49**: M140–M147.
  - 38 Portney L, Watkins M. Foundations of Clinical Research: Applications to Practice, 3rd edn. Philadelphia, PA: F.A. Davis Company, 2015.

Copyright of Psychogeriatrics is the property of Wiley-Blackwell and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.