Integrated Exposure Therapy and Exercise Reduces Fear of Falling and Avoidance in Older Adults: A Randomized Pilot Study

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Objectives: *To evaluate the safety and acceptability of a novel 8-week intervention integrating exercise, exposure therapy, cognitive restructuring, and a home safety evaluation, conducted by a physical therapist, in reducing fear of falling and activity avoidance. To collect preliminary evidence of efficacy.* **Design:** *Randomized pilot study comparing the intervention to time- and attention-equivalent fall prevention education.* **Setting:** *Participants' homes.* **Participants:** *42 older adults with disproportionate fear of falling (high fear, low to moderate objective fall risk).* **Measurements:** *Falls Efficacy Scale-International, modified Activity Card Sort, satisfaction, falls.* **Results:** *Relative to education, the intervention reduced fear of falling (d = 1.23) and activity avoidance (d = 1.02) at 8 weeks, but effects eroded over a 6-month follow-up period. The intervention did not increase falls, and participants rated the exercise, exposure therapy, and non-specific elements as most helpful.* **Conclusions:** *An integration of exercise and exposure therapy may help older adults with disproportionate fear of falling, but modifications to the intervention or its duration may be needed to maintain participants' gains.* (Am J Geriatr Psychiatry 2018; 26:849–859)

Key Words: Anxiety, fear of falling, exercise, activity avoidance, exposure therapy, physical therapy

Highlights

- An 8-week intervention integrating cognitive-behavioral therapy and exercise reduced fear of falling and avoidance in older adults with disproportionate fear of falling relative to in-home fall prevention education.
- The intervention did not increase fall risk.
- Effects on fear and avoidance tended to erode over a six-month follow-up period.

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Clinicaltrials.gov identifier: NCT01609322.

Published by Elsevier Inc. on behalf of American Association for Geriatric Psychiatry.

https://doi.org/10.1016/j.jagp.2018.04.001

Falls are a major cause of morbidity and mortality among older adults.[1] Fear of falling is increasingly recognized as a related but distinct disabling condition.[2] Fear of falling often leads to decreased physical and social activity, which can result in deconditioning, depression, and need for assistance in basic and instrumental activities of daily living (e.g., bathing, grocery shopping).[3] Individuals who fear falling may also modify their gait in ways that can, particularly in the context of deconditioning, increase risk of falls.[4]

Many older individuals develop fear of falling after a fall or in the context of a health condition that affects lower extremity strength or balance.[5] Some older people, however, particularly those with a history of anxiety, may develop fear of falling despite having no history of falls, intact balance, and relatively good health.[6] For these individuals, the level of fear and avoidance may exceed the actual level of fall risk. Older adults with disproportionate fear of falling may require a different treatment approach from older adults at high fall risk.

A number of interventions have addressed fear of falling. Most of these have primarily targeted fall prevention, with fear reduction as a secondary outcome.[7–9] Exercise is particularly effective at reducing fear as well as fall risk in older adults.[7] Interventions are usually conducted in person in the community, although home-based, technology-assisted, and virtual reality interventions have also demonstrated efficacy in reducing both falls and fear.[10–12] Although "dismantling" studies are scarce in this area, one investigation has suggested that cognitive restructuring plus exercise may reduce fear of falling relative to exercise alone.[13]

At least three interventions have been developed to target fear of falling specifically, rather than ancillary to reducing fall risk. The oldest, A Matter of Balance, attempts to increase fall-related self-efficacy with cognitive restructuring techniques taught in a group format by peers or health care professionals.[14] Extensive research in the United States and the Netherlands has established the efficacy, disseminability, and cost-effectiveness of this program, relative to usual care.[15–17] Dutch investigators have also adapted A Matter of Balance to create a seven-session (three in-home and four by telephone) nurse-conducted program.[18] Results from a randomized trial suggested that this intervention reduced fear of falling, avoidance, and disability relative to usual care.

The Strategies for Increasing Independence, Confidence and Energy (STRIDE) program, in which paraprofessional health care assistants conducted individual cognitive behavior therapy (CBT) with participants, reduced fear of falling relative to usual care in a large UK study.[19]

Most recently, with the Back on Your Feet program, mental health providers provided in-home psychotherapy using cognitive restructuring and imaginal and in vivo exposure techniques to reduce posttraumatic stress disorder symptoms and fear of falling among 14 older adults who had experienced an injurious fall.[20]

Although the literature generally supports the use of interventions that integrate CBT components for fear of falling, it is limited in several ways. First, most intervention programs require participants to attend classes in the community. Individuals with the highest levels of fear, who may avoid leaving their homes or yards, are the most likely to drop out or never attend such programs.[14] Second, it may be challenging under current reimbursement constraints for U.S. mental health providers to conduct interventions in the home. Third, interventions for fear of falling do not always measure activity participation as an outcome. Fourth, previous studies have included individuals at high fall risk, rather than targeting those with disproportionate fear. Finally, even some of the larger trials have used a no-treatment or usual care control condition, which limits the scientific validity of the results (e.g., Zijlstra et al.,[17] Dorresteijn et al.,[18] Parry et al.[19]).

In an effort to test an intervention for fear of falling that addresses these limitations, our team developed Activity, Balance, Learning, and Exposure (ABLE).[21] In ABLE, physical therapists (PTs) recruited from home health care agencies conducted an eight-session, in-home intervention that combined an empirically supported fall prevention exercise program, a home safety evaluation, cognitive restructuring, and exposure to feared situations (e.g., walking across the street, getting into a van, using the bathtub) among older adults with disproportionate levels of fear of falling. In the present study, we tested ABLE against an active control condition, in-home fall prevention education (FPE), in a randomized pilot study in order to determine feasibility and safety and develop a preliminary estimate of efficacy. We examined whether ABLE would reduce fear of falling and avoidance more than FPE,

and whether gains would be maintained 6 months following the end of the intervention. In order to evaluate safety of the intervention, we investigated whether ABLE would increase falls. Finally, we sought feedback in both structured and open-ended formats to improve the intervention for future research.

METHODS

Participants

All procedures were approved by the local institutional review board and the trial was registered with the National Institutes of Health clinical trials registry (NCT01609322). Participants were 42 community-dwelling older adults (31 women, 11 men) aged 65 to 91 years (mean: 77.9, SD: 7.3 years) with high levels of fear of falling as measured by a Falls Efficacy Scale-International[22] (FES-I) score greater than 27 recruited from senior health fairs, community presentations, and referrals from geriatric care providers. Because this was a pilot study, the sample size was determined based on feasibility of recruitment and ability to carry out the interventions and assessments rather than a power analysis. Exclusion criteria included high objective risk of falls, using an algorithm derived from Lamb et al.[23] (*either* one fall in the past year plus walking speed ≤0.58 meters/second *or* two falls in the past year plus body mass index [BMI] ≤ 29.2); or risk of injury (>2 falls in the past year); requiring the assistance of another person to walk or transfer; orthostasis (>20-point decrease in systolic or diastolic blood pressure from sitting to standing); history of osteoporotic fracture; BMI 17 or greater; cognitive impairment as measured by 10 or more errors on the Blessed Orientation Memory and Concentration Test[24]; or legally blind (visual acuity <20/60 in both eyes). Individuals who were ineligible due to high fall risk were referred back to their primary care physician for appropriate services. We also excluded those with a history of schizophrenia or bipolar disorder, alcohol or drug abuse in the past 6 months, active suicidal ideation, or currently receiving physical therapy or psychotherapy. Figure 1 displays the flow chart of participants through the study. Two participants dropped out of ABLE (9.5%) after 4 weeks. A total of 40 participants completed treatment and follow-up.

Design

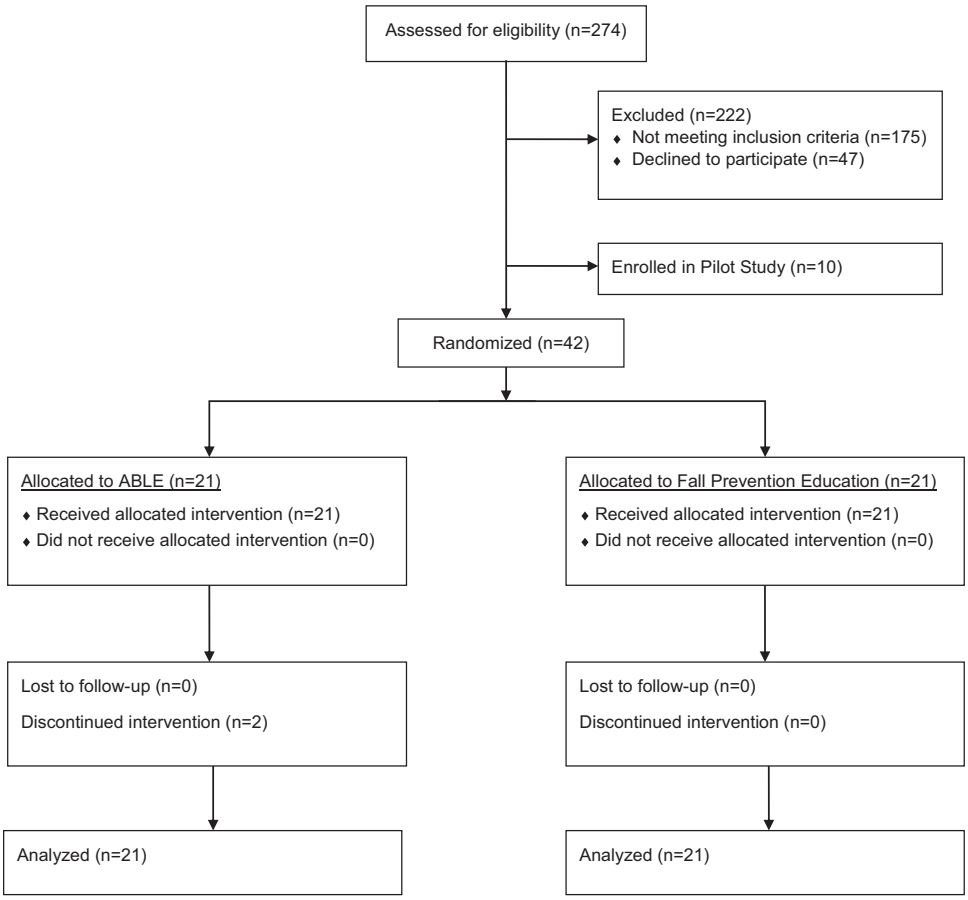
Participants who met initial eligibility requirements after a phone screen were invited to an in-person screening with a psychologist (JLW), physical therapist (KJ), and an orthopedist (DGC) to evaluate subjective and objective fall risk based on the Lamb et al.[23] algorithm and a review of medical history and medications. Eligible and consenting participants completed an in-home baseline assessment prior to randomization. Randomization was determined using a computer-generated sequence created and held by a colleague with no other connection to the study; the project coordinator obtained the assignment after each participant completed the baseline assessment. Both conditions consisted of 8 weekly in-home sessions lasting approximately 1 hour each. All assessments were completed by research associates blind to the participants' treatment condition. Telephone assessments were completed at weeks 2 and 6, and in-home assessments were conducted at weeks 4 and 8. Post-treatment assessments were conducted in the participants' homes at 3 and 6 months post-treatment. Additionally, all participants logged any falls on a calendar that was collected weekly during the active phase and mailed monthly during the follow-up phase.

Interventions

Activity, Balance, Learning, and Exposure

The ABLE intervention has been described in detail elsewhere.[21] Briefly, ABLE is a weekly, 8-session, multicomponent in-home therapy that combines an empirically supported fall prevention exercise program, a home safety evaluation, and exposure-based CBT (manual available upon request from the first author). The ABLE intervention was delivered by two home healthcare agency PTs who received weekly supervision from a PT (KJ) and clinical psychologist (JLW). The exercise component is based on the Otago Exercise Programme to Prevent Falls in Older Adults, which combines flexibility, strengthening, and balance exercises delivered by a PT at sessions 1, 2, 4, and 8.[25–28] Participants were additionally instructed to practice the exercises three times a week and walk for up to 30 minutes twice a week. Additionally, participants were taught how to get up off the floor after a fall. The home safety assessment was conducted by a therapist in

FIGURE 1. CONSORT diagram.



session 3 based on recommendations for eliminating hazards in the home.[29] During this session, the therapist helped participants identify and develop an action plan for addressing hazards in the home (e.g., removing throw rugs, installing grab bars, replacing dim light bulbs with brighter ones). The exposure-based CBT component included psychoeducation about anxiety and the role of avoidance, creation of a fear hierarchy based on identified triggers and avoidance behaviors, exposure practice, cognitive restructuring, and problem-solving. The CBT component was primarily delivered in weeks 5 to 7, with some elements (e.g., psychoeducation about fear and avoidance, development of a fear hierarchy, relapse prevention) integrated into sessions 2, 4, and 8, respectively. Participants were offered the opportunity to invite caregivers or other support people to attend the sessions. In order to ensure fidelity to the intervention, videotapes of a sample of sessions (at least two per participant) were watched by a PT (KJ) and a psychologist (JLW). Feedback was relayed directly to the therapists in weekly supervision calls.

Fall Prevention Education

Fall prevention education (FPE) was based on a guide developed by the Australian Government Department of Health and Ageing, *Don't Fall For It—A Guide to Preventing Falls for Older People*.[30] The intervention was delivered by one doctoral-level psychologist and three graduate students in clinical psychology who received weekly supervision. Sessions included education about reducing personal and environmental risk factors and reducing injury from falls.

Measures

The primary outcome measures were fear of falling and activity avoidance due to fear. Fear of falling was measured with the FES-I.[31] The English language version of this 16-item scale asks participants how "concerned" they are, on a 4-point Likert scale, about falling while carrying out various activities (e.g., cleaning the house, taking a bath or shower, walking on an uneven surface). Although the FES-I is conceptualized as a measure of fall-related self-efficacy, the English version uses the word "concern," which is a term often used by older adults to indicate anxiety.[32] Because anxiety and fear are related constructs, and because the FES-I is well validated and frequently used, we chose it as our measure of fear of falling. One participant completed the brief 7-item version of the FES-I[33] at baseline and week 2 so the item mean was imputed for the missing items to estimate the full FES-I score.

Avoidance was conceptualized as the inverse of activity engagement, which was measured with an adaptation of the Activity Card Sort (ACS).[34] The ACS, commonly used by occupational therapists in assessment and development of rehabilitation plans, consists of a set of pictures of older adults engaging in various instrumental, leisure, physical, and social activities (e.g., shopping, gardening). For purposes of this study, we modified the original measure to include additional cards representing common activities that are often avoided due to fear of falling (e.g., taking a bath) and exclude cards representing activities that are not avoided due to fear of falling (e.g., playing cards) or that are less frequently performed regardless of fear of falling (e.g., travel). From these pictures, participants selected five activities that they would most like to do/do more if they were not afraid of falling. We then asked how many times they had engaged in each activity in the past month. We used the sum of the number of times engaged in each of the five activities as a patient-centered measure of activity engagement.

The study physician used patients' medical history and records to complete the Cumulative Illness Rating Scale for Geriatrics[35] (CIRS-G), which gives a score based on number of organ systems affected by medical conditions. We also administered the Structured Clinical Interview for DSM-IV-TR Patient Edition[36] to diagnose rule-outs (substance abuse, psychosis) and to characterize the sample in terms of anxiety and depressive disorders. Finally, we used the Borkovec and Nau[37] scale to measure credibility and expectations for improvement after the first session and the Patient Satisfaction Questionnaire[38] to assess satisfaction following treatment.

We evaluated the safety of the intervention using a fall log. A fall was defined, per Prevention of Falls Network Europe guidelines, as a slip or trip in which a person loses balance and lands on the floor, ground, or lower level.[39] Participants were given paper calendars and asked to mark days on which they experienced a fall according to those criteria. During the active intervention period, interventionists collected these data on a weekly basis. After the intervention, participants used stamped, addressed envelopes to mail the calendars monthly to the research team. A research assistant called participants to follow up on reported falls, and the principal investigator (JLW) and orthopedist (DGC) were informed and made additional contact with the participant or the participant's primary care provider if clinically indicated.

After ABLE participants finished the study, we provided them with an anonymous survey and a stamped, addressed envelope in order to obtain feedback. We asked them to rate each component of ABLE (e.g., Otago exercises, home safety evaluation) on a 4-point scale from "less helpful" to "most helpful." We asked about the duration of the program, whether they had made changes to their homes after the home safety evaluation, whether they found it helpful to have a caregiver participate, and whether holding the sessions in a group, or in a community location rather than the home, would have influenced their willingness to participate. We gave them the opportunity to provide open-ended comments and suggestions as well.

Statistics

We compared baseline characteristics of the two groups using χ^2 and t tests. Intention-to-treat analyses were conducted using repeated measures mixed effects models to examine differences between treatment groups on the outcomes of interest over time. All models included the fixed effects of time and treatment group, as well as the treatment group by time interaction. Subject variability was modeled as a random effect. Alpha was set at 0.05. Significant time by treatment group interactions were further examined using simple effects tests at weeks 2, 4, 6, and 8.

Analyses were first conducted for the acute phase (pretreatment, week 2, week 4, week 6, and week 8). To evaluate differences between treatment groups during follow-up, a second set of analyses were conducted that included follow-up at months 3 and 6 (pretreatment, week 8, month 3, month 6). All models included credibility scores and presence or absence of a psychiatric disorder as covariates to control for group differences on these variables. The effect size was calculated using Cohen's d.[40] All analyses were conducted using SAS 9.3 (SAS Institute, Cary, NC). Models were assessed using the MIXED procedure which does not use listwise deletion and thus preserves degrees of freedom in the presence of missing data.

RESULTS

Participant Characteristics

Of the 42 participants, 21 were randomized to receive ABLE and 21 were randomized to receive FPE. Demographic characteristics were not significantly different across the two groups (Table 1). For most participants, fall risk derived from self-reports was higher than fall risk derived from objective measures such as gait speed and lower extremity strength,[23] suggesting that these participants were overestimating their risk of falls, as would be expected in a group selected based on disproportionate fear. Mean FES-I scores did not differ significantly between those with objectively low versus objectively moderate fall risk, 38.9 (6.9) versus 42.2 (7.2), $t_{(40)} = -1.34$, $p = 0.19$. There were no significant differences between groups at baseline on severity of fear of falling or avoidance; participants assigned to ABLE were more likely to meet criteria for a psychiatric disorder overall or a past or current history of major depression, and participants assigned to FPE were more likely to meet criteria for specific phobia (not related to falling; Table 2). On average, participants reported relatively low levels of medical comorbidity, with mean CIRS-G scores falling approximately 1 standard deviation below norms for community-dwelling older adults.

TABLE 1. Participant Characteristics

	FPE (N = 21)	ABLE (N = 21)	t	df	p
Age in years, M (SD)	78.5 (7.8)	77.3 (7.0)	0.52	40	0.61
Years of education, M (SD)[a]	15.0 (2.2)	15.3 (3.4)	−0.28	39	0.78
Blessed score, M (SD)	3.0 (3.4)	2.5 (2.8)	0.59	40	0.56
CIRS-G, M (SD)	10.7 (3.7)	13.5 (5.5)	−1.95	40	0.06
			χ^2	df	p
Female, % (N)	81.0 (17)	66.7 (14)	1.11	1	0.29
Race/ethnicity, % (N)			2.23	3	0.52
Asian	9.5 (2)	14.3 (3)			
Black/African American	14.3 (3)	4.8 (1)			
Hispanic	4.8 (1)	14.3 (3)			
Non-Hispanic white	71.4 (15)	66.7 (14)			
Marital status			1.69	3	0.64
Married	33.3 (7)	23.8 (5)			
Widowed	38.1 (8)	33.3 (7)			
Divorced/separated	28.6 (6)	38.1 (8)			
Never married	0 (0)	4.8 (1)			
Work status			3.23	3	0.36
Full-time	4.8 (1)	0 (0)			
Part-time	4.8 (1)	0 (0)			
Retired	85.7 (18)	100 (21)			
Leave of absence	4.8 (1)	0 (0)			
Living arrangements			5.24	3	0.15
Lives with spouse	33.3 (7)	28.6 (6)			
Lives with roommate	14.3 (3)	9.5 (2)			
Lives alone	52.4 (11)	61.9 (13)			

ABLE: Activity, Balance, Learning, and Exposure training; CIRS-G: Cumulative Illness Rating Scale for Geriatrics; FPE: fall prevention education.
[a]N = 20 for ABLE.

TABLE 2. Clinical Characteristics

	FPE (N = 21)	ABLE (N = 21)	t or χ^2	df	p
Falls Efficacy Scale—International, M (SD; range)	39.0 (6.8; 27–51)	40.7 (7.3; 29–56)	0.79	40	0.44
Activity Card Sort, M (SD; range)	14.1 (13.2; 0–43)	14.0 (10.9; 0–36)	−0.03	40	0.98
Self-rated fall risk, % (N):			4.03	2	0.13
Low	14.3 (3)	4.8 (1)			
Moderate	85.7 (18)	81.0 (17)			
High	0.0 (0)	14.3 (3)			
Objective fall risk, % (N):			1.11	1	0.29
Low	81.0 (17)	66.7 (14)			
Moderate	19.1 (4)	33.3 (7)			
Any psychiatric disorder, % (N)	52.4 (11)	85.7 (18)	5.46	1	**0.02**
Current major depression, % (N)	0.0 (0)	19.1 (4)	4.42	1	**0.04**
Past major depression, % (N)[a]	4.8 (1)	38.1 (8)	6.55	1	**0.01**
Specific phobia (not related to falls), % (N)	42.9 (9)	14.3 (3)	4.20	1	**0.04**
Agoraphobia, % (n)	14.3 (3)	4.8 (1)	1.11	1	0.29
PTSD (not due to fall), % (N)	0.0 (0)	9.5 (2)	2.10	1	0.15
OCD, % (N)	4.8 (1)	0.0 (0)	1.02	1	0.31
Social phobia, % (N)	9.5 (2)	19.1 (4)	0.78	1	0.38
Panic disorder, % (N)	0.0 (0)	4.8 (1)	1.02	1	0.31
GAD, % (n)	4.8 (1)	0.0 (0)	1.02	1	0.31
Anxiety disorder NOS, % (N)	0.0 (0)	9.5 (2)	2.10	1	0.15

Notes: **Bolded** values are statistically significant at $p < 0.05$.
ABLE: Activity, Balance, Learning, and Exposure training; FPE: fall prevention education; GAD: generalized anxiety disorder; OCD: obsessive compulsive disorder; PTSD: post-traumatic stress disorder.
[a]N = 20 for FPE.

Acceptability, Credibility, Compliance, and Satisfaction

Completion rates were over 90% (19 of 21) for ABLE and 100% for FPE, suggesting that both interventions were acceptable. One ABLE participant dropped out because of increased anxiety and one did not provide a reason. Credibility and satisfaction data were not available from one ABLE participant. ABLE participants found their intervention slightly more credible than did FPE participants, 9.3 (SD: 0.9) versus 8.6 (SD: 1.2), $t_{(39)} = 1.99$, $p = 0.05$. Satisfaction ratings, however, did not differ significantly between groups (29.9 versus 27.6, $t_{(37)} = -1.83$, $p = 0.08$). On average, ABLE participants completed some at-home assignments on 6.0 weeks and all assignments on 3.7 weeks (out of 7 weeks in which homework was assigned). FPE participants completed some at-home assignments on 6.3 weeks and all assignments on 5.2 weeks.

Outcomes

Fear of Falling

There was a significant group by time interaction for the FES-I, $F_{(4, 37)} = 4.28$, $p = 0.006$ (Figure 2). Participants in the ABLE group demonstrated a significant reduction in fear of falling compared with the FPE group. Significant differences between groups arose at week 6, $F_{(1, 37)} = 4.84$, $p = 0.03$ (Cohen's $d = -1.20$), and week 8, $F_{(1, 37)} = 5.57$, $p = 0.02$ (Cohen's $d = -1.23$).

Evaluation of follow-up effects also revealed a significant group by time interaction, $F_{(3, 37)} = 4.24$, $p = 0.01$. Simple effects tests at each time point were significant for week 8, $F_{(1, 37)} = 5.33$, $p = 0.03$. Differences between groups were not significant at month 3, $F_{(1, 37)} = 3.72$, $p = 0.06$, or month 6 follow-up, $F_{(1, 37)} = 0.56$, $p = 0.46$.

Activity Avoidance

We found a significant group by time interaction from pre to post on the ACS, $F_{(2, 37)} = 4.33$, $p = 0.02$ (Figure 3), demonstrating a significant reduction in avoidance of activities (i.e., increase in ACS score) in the ABLE group compared with the FPE group. Simple effects tests at each time point revealed that significant differences between groups arose at week 4, $F_{(1, 37)} = 6.43$, $p = 0.02$ (Cohen's $d = 1.19$), and week 8, $F_{(1, 37)} = 4.75$, $p = 0.04$ (Cohen's $d = 1.02$).

FIGURE 2. **Comparison of an 8-week in-home, physical therapist–delivered exposure therapy based intervention (ABLE) and in-home fall prevention education (FPE) in reducing fear of falling in 42 older adults with disproportionate levels of fear. FES-I: Falls Efficacy Scale-International, scores range from 16 to 64 with higher scores indicating greater fear of falling. Bars represent standard errors.**

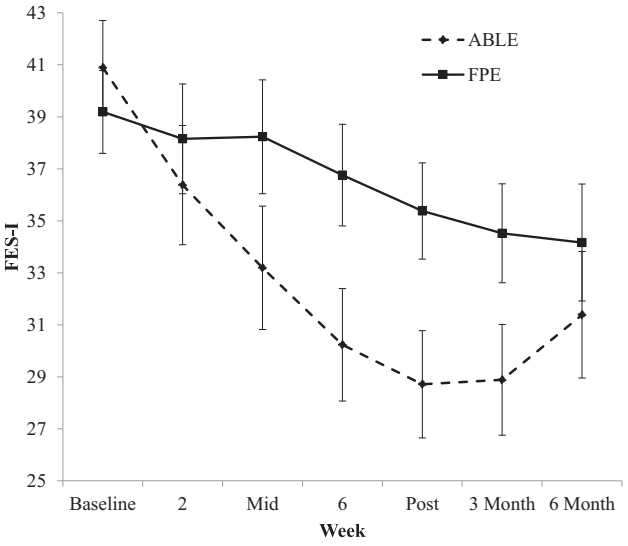
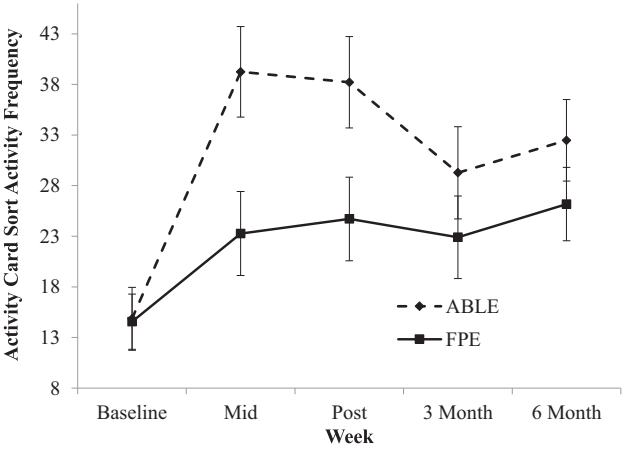


FIGURE 3. **Comparison of an 8-week in-home, physical therapist–delivered exposure therapy based intervention (ABLE) and in-home fall prevention education (FPE) in reducing avoidance in 42 older adults with disproportionate levels of fear. Higher scores on the Activity Card Sort indicate greater frequency of engaging in the activity during the past month. Bars represent standard errors.**



Evaluation of follow-up effects revealed only a significant effect of time ($F_{(3,\ 37)} = 12.33$, $p < 0.001$). The group by time interaction did not remain significant through the follow-up phase ($F_{(3,\ 37)} = 1.59$, $p = 0.21$).

Falls

In the year prior to enrollment, there were no differences between the groups in proportion of participants reporting none, one, or two falls (Table 3). Similarly, no differences in fall rates between ABLE and FPE were observed during the intervention or in the 6 months following the intervention. None of the falls resulted in serious injury.

TABLE 3. **Falls**

	FPE (N = 21)	ABLE (N = 21)	χ^2	df	p
Prior year, % (N)			3.31	2	0.19
0	42.9 (9)	28.6 (6)			
1	52.4 (11)	57.6 (10)			
2	4.8 (1)	23.8 (5)			
During intervention, % (N)			0.36	2	0.83
0	85.7 (18)	81.0 (17)			
1	4.8 (1)	9.5 (2)			
2	9.5 (2)	9.5 (2)			
6-month follow-up, % (N)[a]			5.01	4	0.29
0	81.0 (17)	52.6 (10)			
1	9.5 (2)	26.3 (5)			
2	9.5 (2)	10.5 (2)			
3 or 4	0.0 (0)	10.5 (2)			

ABLE; Activities, Balance, Learning, and Exposure training; FPE; fall prevention education.
[a]N = 19 for ABLE.

ABLE Evaluations

Seventeen of the 19 participants who completed the ABLE intervention returned an anonymous evaluation of the program. Participants rated the Otago exercises and exposure practice, as well as a supportive relationship with the interventionist ("talking to someone"), as the most helpful components of the program (Table 4). The physician office visit (during which medications were reviewed), home safety evaluation, and cognitive restructuring were less often identified as the most helpful components. The majority

TABLE 4. Evaluations of ABLE (N = 17)

How helpful were the different parts of the program?, % (N)	Less Helpful	Helpful	Very Helpful	Most Helpful
1. Doctor office visit	0 (0)	41.1 (7)	47.1 (8)	11.8 (2)
2. Exercises	0 (0)	17.6 (3)	29.4 (5)	52.9 (9)
3. Walking	0 (0)	5.9 (1)	64.7 (11)	29.4 (5)
4. Home safety evaluation	5.9 (1)	35.3 (6)	29.4 (5)	29.4 (5)
5. Learning about concerns and avoidance	0 (0)	23.5 (4)	52.9 (9)	23.5 (4)
6. Exposure practice	0 (0)	5.9 (1)	47.1 (8)	47.1 (8)
7. Learning about unhelpful/helpful thoughts	0 (0)	29.4 (5)	52.9 (9)	17.6 (3)
8. Talking to someone	0 (0)	17.6 (3)	41.1 (7)	41.1 (7)
How willing to participate would you have been if …, % (N)	Much less	A little less	No difference	
Half of the sessions were held in a physical therapy gym?	70.6 (12)	23.5 (4)	5.9 (1)	
Exercise sessions were held in a group?	47.1 (8)	47.1 (8)	5.9 (1)	

of participants felt that the number of sessions and exercises were about right (76.5% and 94.1%, respectively). Twelve participants (70.6%) made at least one change to their homes after the home evaluation (typically removing a floor rug or installing a grab bar). Of those who had a friend, family, or caregiver attend sessions (n = 7), 85.7% found it very helpful. The majority of participants reported that they would have been less likely to participate if sessions were held in a gym or a group rather than in home, one-on-one (Table 4).

CONCLUSIONS

Relative to an in-home fall prevention education program, the ABLE intervention integrating cognitive behavior therapy and exercise reduced fear of falling and avoidance in older adults with disproportionate fear of falling over the 8-week intervention period. There were no differences between the groups in fall rates during or in the 6 months after the intervention, suggesting that, despite increasing activity, ABLE did not increase fall risk. ABLE's effects on fear and avoidance tended to erode over a 6-month follow-up period.

Results from this study compare favorably to four other CBT-based interventions for fear of falling,[14,17–19] all of which used the FES-I. Participants in these investigations had mean baseline FES-I scores ranging from approximately 29 to 42, and effect sizes (d) ranged from 0.16 to 0.43. The mean baseline FES-I in the present study was comparable at 39.9, but the effect size at 8 weeks was substantially larger at 1.23. The effect size of exercise on fear of falling as measured by the FES-I was estimated in a meta-analysis at 0.56.[7]

Sixty-nine percent of participants met criteria for a psychiatric disorder unrelated to falling; of these, most had a pre-existing anxiety disorder. This suggests that disproportionate fear of falling may, in some older adults, be more a manifestation of high pre-existing anxiety levels than a rational response to changes in fall risk due to aging. This further implies that treatment strategies such as exposure therapy may be more effective than other strategies that reduce fall risk without addressing underlying anxiety.

Participants assigned to ABLE were more likely to have a mental health condition, particularly past or current depression, whereas FPE participants had higher rates of current phobia. Although we attempted to control for these differences statistically, it is possible that behavioral interventions may be more potent among psychiatrically ill individuals, and that an intervention that does not include anxiety reduction techniques is particularly ineffective in a group with high levels of anxiety disorders. Both of these factors may have biased our findings in favor of the ABLE intervention.

It is also possible that our frequent assessment of fear of falling may have biased the results, as individuals receiving FPE may have become aware that their intervention was not targeting fear directly. It is not uncommon for intervention studies to include frequent assessments of a primary outcome variable, both to increase sensitivity to change and to minimize analytic problems associated with attrition. These advantages, however, may be outweighed by other factors in studies comparing two very different interventions.

It should be noted that despite the efficacy of the intervention in reducing fear of falling relative to FPE, participants on average still reported high levels of fear

following ABLE, and gains associated with ABLE tended to erode over time. This suggests that more work is needed to amplify and extend the effects of the intervention in order to further reduce fear and prevent relapse. For example, it may be that in a relatively healthy older population at low fall risk, less emphasis should be devoted to fall prevention elements such as exercise and home safety and more to the fear reduction elements of exposure and cognitive restructuring. It should further be noted that the group receiving fall prevention education also tended to improve; it is likely that participants in both groups did better than they would have in usual care.

For this investigation, we deliberately recruited people whose fear exceeded their functional disability, as befits a model of *disproportionate* fear of falling as an anxiety disorder. Many older adults with high levels of fear are more disabled than those enrolled in this study, so the ABLE intervention may not benefit them to the same degree. However, intervening with individuals who have not yet reached a severe level of disability may serve an important preventive function, as well as improve activity levels in older adults with disproportionate fear of falling.

A strength of this study is the utilization of a novel mental health delivery model, using home care physical therapists to integrate elements of behavioral and cognitive therapy into their work. To our knowledge, this is the first study to involve PTs in this manner, despite the fact that they are accustomed to motivating patients to make difficult behavioral changes. One limitation is the relatively brief follow-up period. Furthermore, although we made an effort to develop an intervention that could be implemented with home care PTs as part of their routine practice, it is a relatively intensive treatment. Finally, the sample was predominantly female (although this is consistent with samples of anxious older adults) and Caucasian. Additional research should recruit a larger and more representative sample, in order to ensure generalizability to the population of older adults with disproportionate fear of falling.

The authors thank Caroline Merz, Khanh Ly, Judith Condie, Leigh Malone White, Kimberly Bell, Jason Doctor, Joshua Klapow, M. Claire Robertson, and A. John Campbell for their helpful contributions.

The authors have no disclosures to report. The project was supported by NIMH R34 MH086668.

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