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Getting Grounded Gracefully©: Effectiveness and Acceptability of Feldenkrais in Improving Balance

Freda Vrantsidis, Keith D. Hill, Kirsten Moore, Robert Webb, Susan Hunt, and Leslie Dowson

The Getting Grounded Gracefully© program, based on the Awareness Through Movement lessons of the Feldenkrais method, was designed to improve balance and function in older people. Fifty-five participants (mean age 75, 85% women) were randomized to an intervention (twice-weekly group classes over 8 wk) or a control group (continued with their usual activity) after being assessed at baseline and then reassessed 8 wk later. Significant improvement was identified for the intervention group relative to the control group using ANOVA between-groups repeated-measures analysis for the Modified Falls Efficacy Scale score (p = .003) and gait speed (p = .028), and a strong trend was evident in the timed up-and-go (p = .056). High class attendance (88%) and survey feedback indicate that the program was viewed positively by participants and might therefore be acceptable to other older people. Further investigation of the Getting Grounded Gracefully program is warranted.

Keywords: exercise, elderly, function

Different types of exercise have been shown to improve a range of health outcomes for older people, including balance, mobility, function, mood, and reduced falls (Barnett, Smith, Lord, Williams, & Baumand, 2003; King, Rejeski, & Buchner, 1998; Lord et al., 2003; McMurdo & Burnett, 1992; Song, Lee, Lam, & Bae, 2003; Steadman, Donaldson, & Kalra, 2003). The importance of adequate levels of exercise is being promoted by all levels of government and health professionals, but not all forms of exercise might be equally acceptable to older people. A recent study looking at the prevalence of physical activity among 330 older community-dwelling people in Australia found that in 43.3% of the survey participants, either they were sedentary or their level of exercise was insufficient to obtain health benefits. The authors also found that most survey participants did not engage in vigorous physical activity or strength-type training (Sims, Hill, Davidson, Gunn, & Huang, 2007). An emerging form of exercise in Australia is based on the Feldenkrais method. Feldenkrais is a gentle exercise approach that

Vrantsidis, Hill, Moore, Hunt, and Dowson are with the Preventive and Public Health Division, National Ageing Research Institute, Parkville, Victoria, Australia 3052. Webb is with the Moreland Community Health Service, Coburg, Victoria, Australia 3058.

targets function, body awareness, balance, and safety and appears particularly suited for older people.

The Feldenkrais method engages people in an investigation of the way they move and function and how they might expand their ability to function. Through improved understanding and awareness of how the body organizes for movement, this method addresses habitual patterns of movement and expands a person's self-image. By exploring novel movement sequences attention is brought to parts of the self that might be out of awareness and excluded from a person's functioning. The program aims for a heightened self-awareness, an expansion of a person's repertoire of movement, and improved functioning wherein the whole body cooperates in movement and maximum efficiency is achieved with minimum effort. The Feldenkrais method is taught in two parallel forms, Awareness Through Movement (conducted as a group exercise) and Functional Integration (one-on-one approach; International Feldenkrais Federation, 1994).

The Getting Grounded Gracefully© program, based on the Awareness Through Movement lessons of the Feldenkrais method, works on the premise that to improve balance and function it is necessary to develop an awareness of habitual patterns of movement and expand one's self-image. The program was designed (copyright) by Robert Webb (one of this article's authors) to specifically target dynamic balance, postural and turning stability, and weight-shift transfers. It is based on the assertion that older people are capable of learning about and expanding their range and ease of movement. The program is a novel and gentle form of exercise.

There has been little high-quality research conducted to determine the effectiveness of the Feldenkrais approach in improving health outcomes for older people. Two randomized controlled trial (RCT) studies have investigated the effectiveness of Feldenkrais for older people. The first, a 6-week pseudo RCT study (three classes a week), involved 67 residents in two retirement-housing locations. Location 1 residents were randomized to either the Feldenkrais program or control group, and Location 2 residents were randomized to conventional exercise classes (involving walking, running on the spot, and bending) or a control group (Gutman, Herbert, & Brown, 1977). The study found no significant differences across the three groups in weight, blood pressure, heart rate, balance, flexibility, morale, self-perceived health, and performance of activities of daily living.

The second RCT study ran for 16 weeks (two classes a week) and involved 60 community-dwelling older people randomized into three groups—Feldenkrais, Tai Chi, or control group (Hall, Yin, Ring, Bladden, & Criddle, 1994). The control group showed no significant improvements on any of the outcome measures, whereas the two intervention groups showed improvements on the timed up-and-go and in vitality (from the SF-36). The Feldenkrais group also showed significant improvements on the Frenchay Activities Index, Berg Balance Scale, and physical and emotional measures from the SF-36. The Tai Chi group showed significant improvement on the general health component of the SF-36.

There have been a larger number of studies of younger adults that have shown mixed results (Johnson, Frederick, Kaufman, & Mountjoy, 1999; Malmgren-Olsson & Branholm, 2002; Stephens, DuShuttle, Hatcher, Shmunes, & Slaninka, 2001). The studies to date, however, have many methodological limitations—

small sample sizes, few male participants, short duration of exercise, limited outcome measures, no randomization of participants, and no long-term follow-up. Some studies have used an audiotape rather than a person-led group, substantially limiting the potential effectiveness of the Feldenkrais Awareness Through Movement intervention (Mayo, Fitch, Hart, & Yabsley, 1998), particularly when participants were just learning the program. A systematic review by Ernst and Canter (2005) found that only six RCT studies (across all ages) met their review-inclusion criteria, and all but one study reported positive results. Each RCT had significant methodological weaknesses, however.

A small pilot study, conducted by the National Ageing Research Institute, investigated the 8-week Getting Grounded Gracefully program using a pretest–posttest design. Significant improvements were found in both static (Lord's balance test) and dynamic (step test) balance scores for a sample (n = 30) of older women (average age 74 years; Osborne, Webb, & Vasiliadis, 2003). This pilot study demonstrated the feasibility of implementing a larger trial for older people and provided data for the power estimates for the current study. The current study aimed to evaluate whether the Getting Grounded Gracefully program can improve balance, mobility, and function in older people using an RCT methodology and whether it is an acceptable form of exercise for older people.

Methods

Procedure

The study was conducted in Melbourne, Australia. Participants were recruited through newspaper advertisements; promotion at local community groups, including Returned Service Leagues groups, and retirement villages; and letters sent to volunteers in a research database. Ethics approval was obtained from the Research Directorate, Human Research Ethics Committee of Melbourne Health.

To be eligible, participants had to be age 55 years or over; living at home, in a retirement village, or in a low-care residential aged-care facility; and have at least one functional impairment (based on Questions 1–11 on the Frenchay Activity Index) or have a history of one or more falls in the preceding 6 months. Participants were also required to be able to stand unsupported for at least 1 min and walk short distances indoors (at least 5 m) without a walking aid. The exclusion criteria included cognitive impairment (<7 on the Abbreviated Mental Test Score), inability to understand English (the program was conducted in English), and a marked mobility impairment (unable to walk at least 5 m indoors without a walking aid).

All potential participants were first screened over the telephone to determine eligibility. Written consent to participate was obtained from eligible participants, who then attended a 2-hr balance and function assessment before randomization. Participants were randomized to the intervention group or control group by the use of randomly ordered opaque envelopes by a research officer not involved in the assessments. Assessors were blinded to participant-group allocation.

All baseline assessments were conducted in the 3-week period before the classes commenced. All but one of the follow-up assessments were completed in the 2-week period after the 8-week course of classes was completed (one completed within 3 weeks).

The intervention group participated in the Getting Grounded Gracefully program, which involved two 40- to 60-min sessions per week over an 8-week period (16 sessions in all). The classes were conducted at a community-library meeting room by the program designer, an experienced Feldenkrais practitioner. Handouts were provided at each class covering the basic elements of the day's session. When appropriate (e.g., had access to a CD player), an audio CD covering any class missed was provided to participants. Members of the control group were asked to continue with their usual activity for the next 8–10 weeks during the study. No intervention was provided to the control group during the control phase of the study, but they were offered the Getting Grounded Gracefully program at the completion of the control phase of the study. Classes were provided at no cost, but participants were required to arrange their own transport to and from the classes.

Outcome Measures

In addition to general demographic data, the following clinical and functional measures were assessed. The assessment measures used have moderate to high reliability reported in samples of older people.

- Questionnaires

  The Domestic and Community Activities of Daily Living questionnaire (Frenchay Activity Index) asks the frequency of 15 common activities (Bond, Harris, Smith, & Clark, 1992). Each item has four levels of frequency (0–3 points), with a maximum score of 45 points for all 15 items. A higher score indicates greater frequency of activity being currently undertaken (interrater ICC = .90; Post & de Witte, 2003).

  The Human Activity Profile asks whether 94 different activities are "currently done," "have stopped doing," or were "never done" (Fix & Daughton, 1988). The adjusted activity score has been reported (that is the highest level of activity still being done minus the number of activities that have been stopped that are rated as less demanding; HAP-adjusted activity score—retest ICC = .87; Bilek, Venema, Camp, Lyden, & Meza, 2005).

  Quality of life was measured using the Assessment of Quality of Life tool (internal consistency alpha = .81; Hawthorne, Richardson, & Osborne, 1999). The tool is a 15-item questionnaire with a score range of 0–45, with lower scores indicating better health-related quality of life.

  Fear of falling was evaluated using the Modified Falls Efficacy Scale (retest ICC = .95; Hill, Schwarz, Kalogeropoulos, & Gibson, 1996), which measures confidence in performing 14 common activities without overbalancing. Each activity is scored from 0 (*no confidence at all*) to 10 (*totally confident*), and an average score out of 10 across all items is derived.

  Cognitive status was measured using the Abbreviated Mental Test Score (Hodkinson, 1972). Scores range from 0 to 10, and a score of less than 7 suggests cognitive impairment.

- Clinical measures of balance, gait, and function

  The four-square step test (retest ICC = .98; Dite & Temple, 2002) involves timing participants stepping as quickly as possible in four directions over four sticks on the ground, first in one direction, then in the other.

  The timed up-and-go (retest ICC = .99; Podsiadlo & Richardson, 1991) involves timing participants standing from a 45-cm-high chair, walking 3 m at comfortable speed, turning, and then returning to the chair and sitting down.

  The step test (retest ICC ≥ .90; Hill, Bernhardt, McGann, Maltese, & Berkovits, 1996) involves counting the number of times participants can step one foot fully on and then off a 7.5-cm block step in 15 s as quickly as possible. Each leg was tested separately, and performance on the worse side was analyzed.

  Leg-muscle strength was measured using the timed sit-to-stand (three times; Tinetti, Doucette, Claus, & Marottoli, 1995), in which the speed of standing up and sitting down three times from a 45-cm-high chair, without using the arms, is timed (timed sit-to-stand five times ICC = .89; Lord, Murray, Chapman, Munro, & Tiedemann, 2002).

  Gait was measured using the Clinical Stride Analyzer (CSA, a computerized footswitch system). The distance measured was the central 6-m section of a 10-m walkway. Participants were instructed to walk at a comfortable speed. The measures used in the analysis included gait speed (m/min) and double-support duration (% gait cycle, a measure of stability during gait; Evans, Goldie, & Hill, 1997). On occasions when the CSA was not available or malfunctioned, gait velocity was measured using a stopwatch (gait speed and double support retest ICC = .95 and .85, respectively; Hill, Goldie, Baker, & Greenwood, 1994).

- Force-platform measures of gait, mobility, and function

Using the Neurocom Balance Master (a force platform) with the long plate (Liston & Brouwer, 1996), the following measures were used in the analysis: limits of stability, reaction time and maximum excursion—a measure of speed and amplitude of weight shift in eight directions (composite scores of all eight directions); rhythmic weight transfer—a measure of accuracy and coordination of repeated weight shift in the forward and backward directions and the side-to-side direction with both feet remaining on the ground, at three speeds (moderate-velocity speed used in analyses); step quick turn—a measure of stability or balance during walking and turning to each side (worst turn time and sway used in analyses); walk across platform—step width while walking at a comfortable speed across the force platform starting 1 m before the start of the long plate; stability during sit-to-stand—measures of weight-transfer time and rising index (force exerted to rise, an indicator of muscle strength) used in analyses; and the modified Clinical Test of Sensory Interaction of Balance (mCTSIB)—center-of-pressure measure of the ability to stand under conditions of reduced or conflicting sensory cues (eyes open and eyes closed, on firm surface and on high-density foam—composite score used in analyses). Reliability of a number of measures on the Neurocom Balance Master have been reported (e.g., mCTSIB and two clinical observers—interrater ICC = .53–.81 for all except eyes open on firm surface [poor to fair; Loughran, Tennant, Kishore, & Swan, 2005]; limits of stability (time)—retest ICC = .88 and weight shift left/right and front/back—retest ICC ≤ .4 [poor; Liston & Brouwer]; and step quick-turn time and sway—interrater ICC = .78 and .88, respectively, and retest ICC = .70 and .72, respectively [Naylor & Romani, 2006]).

After finishing the Getting Grounded Gracefully program, the participants completed a satisfaction survey we had developed. Several open-ended questions were included in the survey. Common themes were grouped together and summarized; the groupings and summaries were reviewed for agreement on three separate occasions. Attendance at classes was also recorded.

Statistical Analysis

Power analyses based on preliminary data from a pilot study by our group on one of the clinical balance measures (the step test), using an alpha of .05 and power of 80%, indicated that 35 participants per group would be required. Allowing for a 20% dropout rate (consistent with previous exercise studies with older people by our group and others), an overall sample size of 42 per group (or 84 overall) was required. For continuous, normally distributed variables, independent *t* tests were used to compare baseline demographic, activity, and function measures. For dichotomous variables, chi-square tests were used. Pearson's *r* correlations were calculated between all measures at baseline to determine the level of multicollinearity between variables. For outcome measures with normal distribution, ANOVA using between-groups repeated-measures design was used to compare baseline and postassessment performance between the two groups (control and Feldenkrais group) across all variables. A critical value of $p < .05$ was used for all analyses.

Results

Participants

Over 150 phone calls were received from older people interested in participating in the Getting Grounded Gracefully program. Many, however, were ineligible (did not have a fall history or any functional impairment); the day or time of the classes did not suit them; or the venue was too far away. Sixty-two eligible people were recruited (written consent obtained) and assessed at baseline (Figure 1). Seven (11%) people withdrew from the project before the postintervention assessment (4 from the control group and 3 from the intervention group). One additional person was assessed but found to be ineligible (because of a marked mobility impairment). Reasons for withdrawing from both groups included medical problems not related to the study ($n = 3$), prior commitments ($n = 1$), health issues in the family ($n = 1$), and no longer being interested ($n = 2$). Fifty-five people completed both the baseline and follow-up assessments (26 from the intervention group and 29 from the control group). Most participants were recruited via ads in newspapers (local and statewide; 36%) or through senior-citizen or Returned Service League groups (24%).

There were no significant differences between the intervention and control group in any of the baseline general demographic, function, or activity profiles

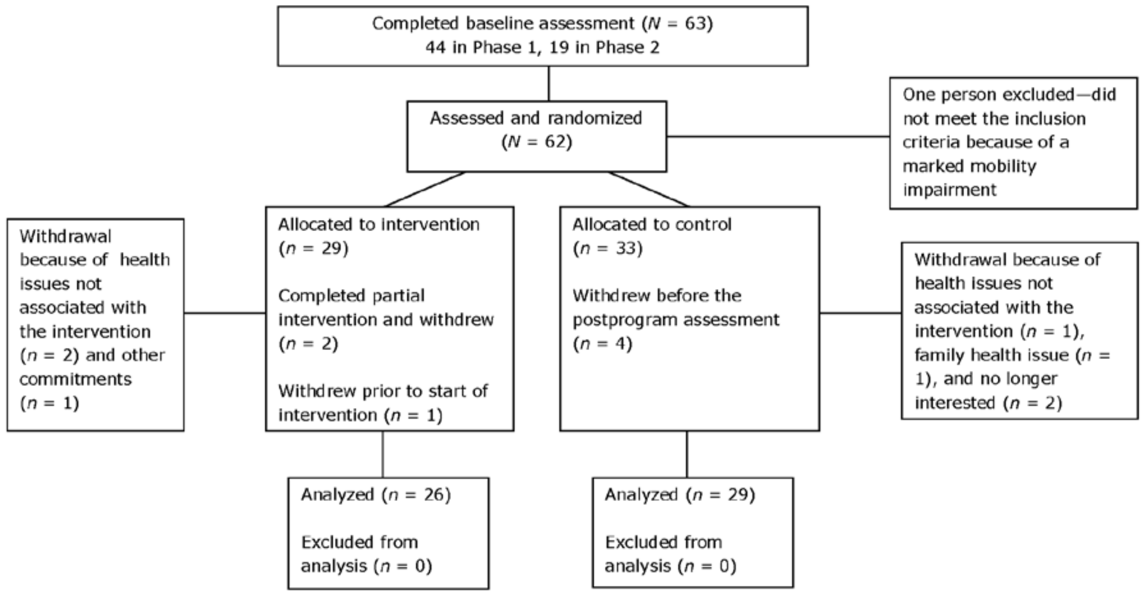

Figure 1 — Recruitment and assessment flowchart.

Table 1 Demographic Data and Function and Activity Profile (at Baseline) for Intervention and Control Participants

	Intervention n = 26	Control n = 29	All participants N = 55	p
Age, M (SD), range	75.4 (8.6), 58–94	74.4 (7.9), 56–89	74.9 (8.2), 56–94	.67
Gender, % (n)				.17
male	15% (4)	31% (9)	24% (13)	
female	85% (22)	69% (20)	76% (42)	
Marital status, % (n)				.59
married	27% (7)	24% (7)	25.5% (14)	
widowed	42% (11)	55% (16)	49% (27)	
other	31% (8)	21% (6)	25.5% (14)	
Living arrangements, % (n)				.90
at home alone	50% (13)	48% (15)	51% (28)	
at home with family/other	50% (13)	52% (14)	49% (27)	
Number of health problems,[a] M (SD), range	4.4 (2.2), 0–9	4.5 (1.9), 1–8	4.4 (2.0), 0–9	.76
Number of medications taken, M (SD), range	4.5 (2.5), 0–9	4.6 (2.9), 0–11	4.5 (2.7), 0–11	.90
Human Activity Profile–adjusted activity score, M (SD)	57.0 (16.9)	55.0 (14.6)	56.0 (15.7)	.63
Assessment of Quality of Life score, M (SD)	26.4 (5.1)	26.6 (5.5)	26.5 (5.3)	.85
Frenchay Activities Index, M (SD)	32.5 (7.6)	31.3 (6.8)	31.9 (7.2)	.54
Abbreviated Mental Test Score, M (SD)	9.0 (1.3)	9.4 (0.7)	9.2 (1.0)	.13
Modified Falls Efficacy Scale, M (SD)	(n = 25) 8.1 (1.4)	(n = 29) 8.6 (1.4)	(n = 54) 8.4 (1.4)	.20

[a]Including both previous and current medical problems.

(Table 1 and 2). Most participants were women (76%), with a mean age of 75 years and a mean Abbreviated Mental Test Score of 9.2 (*SD* 1.0). Participants had a mean number of 4.4 medical problems (current and past) and were taking on average 4.5 medications. Participants reported undertaking three different types of activity per week at the time the study began. Activities were categorized as organized or recreational nonorganized activities (see Table 2). An organized activity was defined as a group- or center/facility-based activity with set times and days undertaken for the main purpose of exercising. A recreational nonorganized activity was defined as an activity undertaken alone or with friends for recreational purposes or an activity with no formal structure (time, day, or location). Gardening and heavy housework were included in this second category. The most common activities undertaken were walking (90.1%), gardening (67.3%), and housework (heavy duties; 52.7%). Only 15 (27%) participants reported taking part in any form of organized activity.

Table 2 Type of Activity Undertaken at the Beginning of the Study, % (*n*)

	Intervention (*n* = 26)	Control (*n* = 29)	All participants (*N* = 55)
Organized activity			
strength training at a gym	3.8% (1)	3.4% (1)	3.6% (2)
Tai Chi	7.7% (2)	13.8% (4)	10.9% (6)
group exercise program (strength, balance)	7.7% (2)	17.2% (5)	12.7% (7)
walking group	11.5% (3)	0% (0)	5.5% (3)
other organized activity	3.8% (1)	6.9% (2)	5.5% (3)
activity details not reported	0% (0)	3.4% (1)	1.8% (1)
number of participants involved in one or more organized activity	26.9% (7)	27.6% (8)	27.3% (15)
Recreational nonorganized activity			
walking	88.5% (23)	93.1% (27)	90.1% (50)
bowls/boccie	7.7% (2)	17.2% (5)	12.7% (7)
golf	3.8% (1)	0% (0)	1.8% (1)
swimming	11.5% (3)	3.4% (1)	13.8% (4)
gardening	58.7% (17)	69.0% (20)	67.3% (37)
housework (heavy duties)	58.7% (17)	41.4% (12)	52.7% (29)
dance groups	3.8% (1)	10.3% (3)	13.8% (4)
cycling	3.8% (1)	3.4% (1)	3.6% (2)
other	15.4% (4)	6.9% (2)	10.9% (6)
activity details not reported	0% (0)	3.4% (1)	1.8% (1)
number of participants involved in one or more recreational nonorganized activities	96.2% (25)	96.6% (28)	96.4% (53)
Average number of physical activities undertaken, *M* (*SD*), range (p = .93)	(n = 26) 3 (1.5), 0–7	(n = 28) 3 (1.4), 1–8	(n = 54) 3 (1.4), 0–8

Note. All but 1 participant (intervention) reported undertaking at least one physical activity. One person (control) did not provide any physical activity details.

Correlations were calculated between all baseline measures to determine the level of multicollinearity between variables. Only one pair of the variables had strong interitem correlations (>.80); this was between the two measures of turning stability—step quick-turn time (worse leg) and step quick-turn sway (worse leg)—Pearson's r correlation coefficient = .81. All other interitem correlations were lower than .80, and most had r values of .60 or below. To overcome the issue of multicollinearity between the two step quick-turn measures, we have only included the "step quick-turn time—worst" in the subsequent analyses.

For the intervention group, class attendance ranged from 9 to 16 classes (16 classes in all). Most participants (19 of 26; 73%) attended 14–16 classes. Overall attendance was 87.7%, and 40 individual class CDs were provided to participants who had missed one or more classes.

Effectiveness of the Getting Grounded Gracefully Program

Figure 2 shows scores for the study sample at the initial assessment and comparison scores for healthy samples of older people for six performance measures. The study participants' performance was 14–35% worse on these measures, indicating that our sample had mild to moderate balance and functional limitations.

Table 3 outlines the initial and follow-up assessment results for the various balance, function, and other measures and includes percentage change for both groups. Based on ANOVA using between-groups repeated-measures design, differences in performance scores of each group over time (interaction effect) are reported.

Both groups made improvements on many of the outcome measures. Significant interaction effects were evident for two measures, however—the CSA gait speed (p = .028) and the Modified Falls Efficacy Scale (p = .003). The intervention group had a 7.8% improvement in gait speed in the postassessment, whereas there was little change in the control group's scores (0.4% worse). The intervention group's confidence (falls efficacy) had improved by 6.2%, whereas the control group's confidence had decreased by 10.4%.

A near-significant group–time interaction was also evident for the timed up-and-go (p = .056). The intervention group's performance had improved by 3.3%, whereas the control group's performance deteriorated by 7%.

The intervention group showed minor improvement or slightly less deterioration (though not significant) over time than the control group on most measures (14 of 17). The magnitude of the difference in percentage change between the two groups ranged from a nominal 0.4% to 16.2% (for the Modified Falls Efficacy Scale). Eight of these measures had a change difference of 5% or more, with positive trends evident in the Human Activity Profile (p = .13) and the step test (worse leg; p = .13).

Post Hoc Power Analysis

The power analysis was repeated post hoc. For significant variables, power of 88% was identified for the Modified Falls Efficacy Scale and 60% for gait speed (alpha = .05). For variables with a p value of less than .2 but greater than .05, the post hoc calculated power was 49% for the timed up-and-go, 33% for the step test, 32% for the Human Activity Profile, and 25% for the four-square step test. These results highlight the limited power of the study sample.

Acceptability of the Feldenkrais Program

Class attendance was high (87.7%), and feedback from the satisfaction surveys was positive. Twenty-two intervention-group participants (85%) completed the satisfaction survey at the end of the Getting Grounded Gracefully program.

Most participants reported enjoying the Getting Grounded Gracefully program "very much" (20, 91%), that the length of each session was the "right amount" (20, 91%), and the level of energy required for the program was the "right amount" (13, 59%) or "challenging but not tiring" (8, 36%). Four participants related their tiredness more to the concentration required "to put it all together." Most participants also reported that the Feldenkrais practitioner met

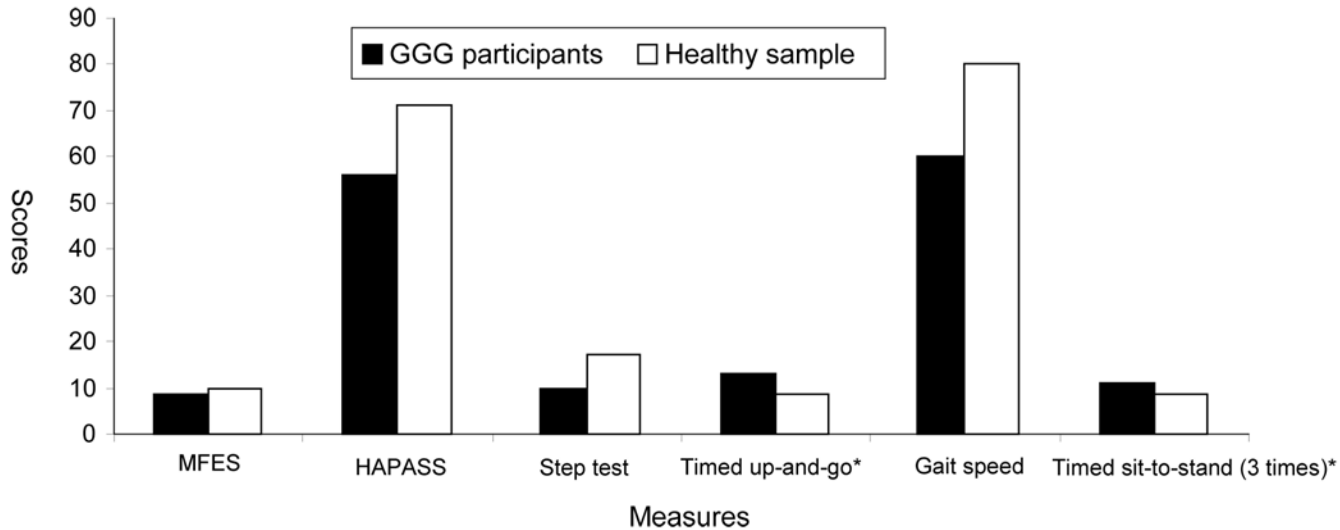

Figure 2 — Comparison of the study participants' initial assessment scores with normative data for healthy samples of older people. *Lower scores indicate better performance (timed up-and-go, timed sit-to-stand). MFES, HAPASS, and step test (Hill, Schwarz, Flicker, & Carroll, 1999); timed up-and-go (Podsiadlo & Richardson, 1991); gait speed (Steffen, Hacker, & Mollinger, 2002); and timed sit-to-stand (Tinetti et al., 1995). GGG = Getting Grounded Gracefully; MFES = Modified Falls Efficacy Scale; HAPASS = Human Activity Profile–adjusted activity score.

Table 3 Balance, Function, and Other Clinical Measures

Outcome measure	Group	Baseline assessment *M* (*SD*)	Postassessment *M* (*SD*)	Change	*p*[a]
Human Activity Profile–adjusted score (n = 54), HB	intervention	57.08 (16.9)	58.58 (14.6)	+2.6%	.132
	control	55.00 (14.6)	53.61 (15.4)	–2.5%	
Frenchay Activities Index (n = 54), HB	intervention	32.54 (7.6)	33.35 (7.8)	+2.4%	.521
	control	31.32 (7.0)	31.39 (7.2)	+0.2%	
Modified Falls Efficacy Scale (n = 54), HB	intervention	8.13 (1.4)	8.63 (1.6)	+5.8%	.003
	control	8.63 (1.4)	7.73 (1.9)	–10.4%	
Assessment of Quality of Life (n = 50), LB	intervention	26.35 (5.1)	26.39 (5.9)	–0.2%	.338
	control	26.56 (5.6)	25.67 (6.1)	+3.4%	
Four-square step test, s (n = 54), LB	intervention	15.19 (7.0)	12.37 (3.3)	+18.6%	.195
	control	14.97 (5.3)	13.68 (5.8)	+8.6%	
Timed up-and-go, s (n = 54), LB	intervention	12.56 (4.0)	12.15 (2.9)	+3.3%	.056
	control	13.33 (3.5)	14.34 (4.3)	–7.0%	
Step test, worse leg, number in 15 s (n = 52), HB	intervention	10.33 (4.0)	11.67 (3.7)	+11.5%	.129
	control	10.07 (3.5)	10.46 (3.8)	+3.7%	
Timed sit-to-stand, 3 times, s (n = 53), LB	intervention	9.97 (3.4)	8.31 (2.4)	+16.6%	.647
	control	11.85 (4.8)	10.56 (4.1)	+10.9%	
CSA gait speed, m/min (n = 54), HB	intervention	61.03 (14.0)	66.17 (12.8)	+7.8%	.028
	control	59.87 (12.7)	59.66 (14.4)	–0.4%	

CSA double support, % of gait cycle (*n* = 33), LB	intervention	35.19 (4.9)	34.52 (6.0)	+1.9%	.359
	control	37.34 (9.0)	35.03 (7.1)	+6.2%	
CTSIB sway velocity (composite), °/s (*n* = 54), LB	intervention	1.33 (0.6)	1.30 (0.6)	+2.3%	.988
	control	1.47 (0.7)	1.45 (0.7)	+1.4%	
Limits-of-stability reaction time (composite), s (*n* = 54), LB	intervention	1.32 (0.4)	1.18 (0.4)	+10.6%	.813
	control	1.27 (0.3)	1.15 (0.3)	+9.4%	
Limits-of-stability maximum excursion (composite), % (*n* = 54), HB	intervention	73.92 (12.2)	78.58 (14.4)	+5.9%	.369
	control	71.82 (13.8)	74.61 (15.1)	+3.7%	
Rhythmic weight shift, left/right (moderate speed), °/s (*n* = 50), HB	intervention	4.27 (1.4)	4.56 (1.1)	+6.4%	.200
	control	4.43 (1.2)	4.30 (1.0)	–2.9%	
Rhythmic weight shift, front/back (moderate speed), °/s (*n* = 49), HB	intervention	2.56 (0.9)	2.73 (0.8)	+6.2%	.623
	control	2.75 (2.3)	2.68 (0.9)	–2.5%	
Walk across platform, step width, cm (*n* = 46), LB	intervention	15.94 (4.3)	15.91 (4.5)	+0.2%	.494
	control	16.78 (3.5)	17.34 (3.1)	–3.2%	
Step quick-turn time (worse of left/right), s (*n* = 54), LB	intervention	2.16 (0.9)	1.67 (0.8)	+22.7%	.280
	control	2.24 (0.6)	1.93 (0.7)	+13.8%	
Stability during sit-to-stand, weight transfer, s (*n* = 50), LB	intervention	0.65 (0.5)	0.41 (0.3)	+36.9%	.893
	control	0.60 (0.4)	0.35 (0.2)	+41.7%	
Stability during sit-to-stand, rising index, % body weight (*n* = 50), HB	intervention	13.00 (5.4)	15.54 (4.8)	+16.3%	.806
	control	12.19 (5.5)	14.50 (5.1)	+15.9%	

Note. HB = higher score is the better score; LB = lower score is the better score; CSA = clinical stride analyzer; CTSIB = clinical test of sensory interaction of balance.

[a]*p* value for interaction effect (change over time based on group allocation).

their individual requirements to a “high degree” (12, 41.4%) or a “very high degree” (10, 34.5%). Nine respondents (41%) indicated that they would “definitely” undertake Feldenkrais in the future, and 9 others indicated that they probably would or might (Table 4).

Participants reported self-perceived improvements in their ability to do everyday things since beginning the program, including improvement in balance (n = 4), in walking/mobility and movement generally (n = 10), in using steps (n = 2), and in turning while driving (n = 2). Six participants responded “yes” to there

Table 4 Satisfaction Survey (Closed Questions)

Question	Response	% (*n*)
To what degree did the Feldenkrais practitioner meet your individual requirements?	very low	0% (0)
	low	0% (0)
	average	18% (4)
	high	45% (10)
	very high	32% (7)
	not reported	5% (1)
How would you rate the exercise facility?	poor	0% (0)
	not good	0% (0)
	average	18% (4)
	good	55% (12)
	very good	27% (6)
Did you find the level of energy required for the program ___?	too tiring	5% (1)
	challenging but not too tiring	36% (8)
	right amount	59% (13)
Was the length of each session ___?	too short	4.5% (1)
	right amount	91% (20)
	too long	4.5% (1)
Did you enjoy the program?	not at all	0% (0)
	not very much	0% (0)
	a little	9% (2)[a]
	very much	91% (20)
Do you think you will undertake Feldenkrais again in the future?	no	0% (0)
	maybe, depending on cost, location, etc.	14% (3)
	not sure	27% (6)
	probably	18% (4)
	definitely	41% (9)

[a]One participant qualified this response with “depended on the activity; some activities were enjoyed very much.”

being a change but did not specify the nature of the change. Only 3 people reported no change (n = 1) or "not sure/maybe" (n = 2).

In terms of the participants' experience of the program, in relation to balance, confidence, walking, or any other aspects addressed by the program, all 18 people who responded to this question (82%) reported a benefit. Participants reported an "improvement" (n = 8); easier/smoother/further movement (n = 5); being fitter (n = 1) or more relaxed (n = 1); or having greater enjoyment (n = 1) in relation to their balance (n = 7), walking (n = 10), confidence (n = 7), body movements (n = 2), or a combination of all four.

Other key benefits reported by participants included the social interaction (n = 7); learning something new and challenging generally or to improve one's health or mind (n = 4); and a range of specific improvements (e.g., use upper body, ankle improved; n = 3). Participants reported learning "awareness of how" the body moves (n = 7) or to think about their movements and surroundings (n = 3) or "how to" better undertake a range of movements (e.g., balance, bending, getting out of a chair; n = 4).

One class activity (walking along a line, one foot in front of the other) was reported to have aggravated symptoms (giddiness) for 1 participant, and she was instructed in ways to modify this. No other symptoms or adverse events were reported in the survey or to the instructor during any of the classes.

Participants' open comments about the overall program indicated that it was beneficial (n = 5), enjoyable (n = 3), and informative ("learned a lot"; n = 2) and that the facilitator was very good (e.g., instructive, understanding; n = 4). Participants were happy and grateful to be involved in the program (n = 4), and 1 participant stated the intention to recommend it to others.

Discussion

Effectiveness

The results of this study have identified significant improvements in measures of falls efficacy and gait speed and trends for improved balance (step test), mobility (timed up-and-go), and activity level associated with participation in a 16-class, 8-week Feldenkrais exercise program. A difference of 7.4% in the change between the two groups in gait velocity, one of the most commonly used clinical measures, is in the range defined as "small meaningful change" in older people (Perera, Mody, Woodman, & Studenski, 2006) and above the minimum detectable change levels reported for hip-fracture and stroke patients (Evans et al., 1997; Palombaro, Craik, Mangione, & Tomlinson, 2006).

The premise that a better understanding of how the body organizes itself for movement and an investigation of ways of expanding one's repertoire and ease of movement is the basis on which the Feldenkrais Awareness Through Movement lessons help improve movement and function. Qualitative data from the satisfaction survey indicate that participants' "awareness" of the body and how it moves improved, and they noted greater ease in walking and improved balance and confidence. This greater confidence was evident in the statistically significant change in the Modified Falls Efficacy Scale score for the intervention group (the intervention group improved by 6%, whereas the control group worsened by 10%). Given that a lack of confidence in mobility can often lead older people to limit their activity because of the fear of falling, which can lead to deconditioning and increased falls risk (Zijlstra et al., 2007), this is an important practical outcome. Longer term gains might be evident in the future for these participants. A trend was also evident in the Human Activity Profile–adjusted activity score, with a 2.6% increase of activity reported in the intervention group, compared with a 2.5% decrease in the control group.

Significant (or near significant) improvements were evident for two other measures, the timed up-and-go and CSA gait speed, and a trend was evident for the step test, all measures of dynamic balance, and gait. A strong focus of the Feldenkrais program involves a number of dynamic balance movements aimed at improving the ease and efficiency of walking and getting up from a chair, so positive changes in these measures could be anticipated from an understanding of the movements focused on in the Getting Grounded Gracefully program.

Although postural and turning sway and weight-shift transfers were also expected to improve (they are also key focal points of the Feldenkrais method), there were no significant changes in these measures. Possible explanations for the lack of observed effect on these types of measures might include that the selected measures were not the most appropriate ones (although these are difficult constructs to assess), that the program might require some modification to strengthen these components within the current program format, or that the duration of the program was insufficient for changes in these domains.

Eight weeks (16 classes) might not be sufficient time for participants to gain the required level of awareness or to incorporate these adjustments into their automatic repertoire. Jain, Janssen, and DeCelle (2004), who reviewed both the Alexander technique and the Feldenkrais method, reported that the length of time needed to achieve overall awareness of movement through either of these two methods varied widely and depended on the student (participant) and teacher (trainer). Both techniques involve small, subtle movements and adjustments, and the learning, processing, and use of this information vary widely depending on the individual and his or her motivation, goals, and level of dysfunction. Current research-based evidence is not available to guide practitioners in this regard. Further investigation is warranted to more fully explore the potential for programs such as Getting Grounded Gracefully to affect domains such as postural or turning sway and weight-shift transfer. In practice, Getting Grounded Gracefully participants are advised to continue their lessons to maintain and further improve balance and function after completing the 8-week program. Six participants in the study (and 1 who withdrew) purchased copies of the Getting Grounded Gracefully CDs for home practice.

Both the intervention and control group improved over time on a number of the other balance and gait measures. Improvement by the control group might be a result of the impact of having a comprehensive balance assessment or the interest that this group of older people had in exercising. The control group did not increase its activity levels according to the items assessed on the Human Activity Profile–adjusted activity score, so the explanation for the improved performance on some measures by the control group remains unclear.

Given that the current study was underpowered by 22% (15 participants) based on the original power estimates (70 participants were required) and that change in scores positively favored the intervention group on most measures, additional participants might have produced significant results on more of the outcome measures. Despite a broad range of recruitment strategies, recruitment was lower than anticipated. This might in part be related to a lack of general awareness about the Feldenkrais approach in the broader community. Based on the current study's results (for measures with a p value of less than .13) 86–92 participants would be required to provide sufficient power (alpha of .05 and power of 80%) on these measures. Post hoc power analysis for measures with a p value of .2 or less indicated that power ranged from 25% to 88%.

Acceptability

There seemed to be a high level of interest in and acceptability of the Feldenkrais program among participants who completed the program. Class attendance was high, and dropouts or missed classes were generally a result of heath-related issues and other commitments, not related to the study.

The number and type of physical activities reported by participants at commencement of the study also support the premise that older people are open to activity options, with most doing at least one physical activity and on average undertaking three activities (most commonly walking, gardening, and heavy housework). Only 15 (27%) people participated in an organized activity, however. Whether this is because of the cost, the lack of appropriate venues or session dates, or a lack of interest in organized activity generally or in the types of organized exercises that are generally available was not investigated in this study. However, 59% of participants indicated that they would definitely or probably undertake Feldenkrais in the future. Most participants found the classes enjoyable and reported a range of benefits as a result of the program.

Similar to other studies, more women than men were recruited into the study, so the ability to generalize the findings (both in terms of effectiveness and acceptability) to men is limited. Second, in terms of selection bias, older people who volunteer to take part in an exercise-based study might be more motivated than the general older population.

Conclusion

The Getting Grounded Gracefully program based on the Awareness Through Movement form of the Feldenkrais method showed some positive outcomes, and qualitative data from the participant surveys suggest that the program might be an acceptable form of exercise for older people. There was a significant change in the intervention group's confidence on the objective Modified Falls Efficacy Scale, and this was supported in the qualitative feedback. A significant change in gait speed, a near-significant change in the timed up-and-go, and a strong positive trend in the step test (worse leg) all indicate some improvement in dynamic balance in the intervention group compared with the control group, despite the short intervention duration and the study being underpowered. These results, and the positive participant feedback on the Feldenkrais program, support the feasibility of conducting further research work on the Feldenkrais method to more conclusively determine its ability to improve function and balance in older people and to help establish appropriate guidelines in terms of program duration and specific course-content emphasis.

Acknowledgments

The Getting Grounded Gracefully program is available from Feldenkrais Connections, 8 Montpellier Crescent, Lower Templestowe, Victoria, Australia, 3107, or through the Web site www.gettinggroundedgracefully.com.au

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A conflict of interest might have been present in that the designer (and supplier) of the Getting Grounded Gracefully program was the Feldenkrais practitioner in this study and that CDs of the program were purchased by interested participants at the end of the study.

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