Getting Grounded Gracefully©

Effectiveness and acceptability of Feldenkrais in improving balance related outcomes for older people: a randomised trial.

Authors:

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

Author for correspondence:

Professor Keith Hill, Faculty of Health Sciences, La Trobe University, c/o Bundoora Extended Care Centre, Bundoora, Victoria, AUSTRALIA 3083. Ph 61 3 94953233; Fax 61 3 83872153; email: keith.hill@latrobe.edu.au

Running head: Feldenkrais and balance related outcomes

Vrantsidis, Hill, Moore, Hunt and Dowson are with the Preventive and Public Health Division, National Ageing Research Institute, Parkville, Victoria, Australia 3052. Hill is also with the Faculty of Health Sciences, LaTrobe University and Northern Health, Bundoora, Victoria, 3083. Webb is with the Moreland Community Health Service, Coburg, Victoria, Australia 3058.

Abstract:

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% female) were randomised to the intervention (twice weekly group classes over 8 weeks) or the control group (continued with their usual activity) after being assessed at baseline, then reassessed eight weeks 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 ($p=0.003$) and gait speed ($p=0.028$), and a strong trend evident in the Timed Up and Go ($p=0.056$). High class attendance (88%) and survey feedback indicate that the program was viewed positively by participants and may therefore be acceptable to other older people. Further investigation of the Getting Grounded Gracefully program is warranted.

Introduction

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 are being promoted by all levels of government and health professionals, but not all forms of exercise may be equally acceptable to older people. A recent study looking at the prevalence of physical activity amongst 330 older community dwelling people in Australia found that 43.3% of the survey participants were either sedentary or their level of exercise was insufficient to obtain health benefits. The authors also found that the majority of 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 which targets function, body awareness, balance and safety, and appears particularly suited for older people.

The Feldenkrais Method engages a person 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 organises 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 may 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 where 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 to 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 the self-image. The program was designed (copyright) by Robert Webb (one of the authors) to specifically target dynamic balance, postural and turning stability and weight shift transfers. It asserts 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.

However, there has been little quality research conducted to determine the effectiveness of the Feldenkrais approach in improving health outcomes for older people. Two randomised controlled trial (RCT) studies have investigated the effectiveness of Feldenkrais for older people. The first, a 6 week pseudo–RCT study (3 classes a week), involved 67 residents in two retirement housing locations. Location 1 residents were randomised to either the Feldenkrais program or control group, and location 2 residents were randomised to conventional exercise classes (involving walking, running on the spot, bending) or control group (Gutman, Herbert, & Brown, 1977). The study found no significant differences across all three groups in weight, blood pressure, heart rate, balance, flexibility, morale, self-perceived health and performance in activities of daily living.

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

The second RCT study ran for 16 weeks (2 classes a week) and involved 60 community dwelling older people randomised into three groups - Feldenkrais, Tai Chi or control group (Hall, Yin, Ring, Bladden, & Criddle, 1994 unpublished). The control group showed no significant improvements on any of the outcome measures while the two intervention groups showed improvements on the Timed Up and Go and vitality (from 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). However, the studies to date have many methodological limitations - small sample sizes, few male participants, short duration of exercise, limited outcome measures, no randomisation 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 learning the program. A systematic review by Ernst and Canter (2005) found only six randomised controlled studies (across all ages) met their review inclusion criteria and all but one study reported positive results. However each RCT had significant methodological weaknesses.

A small pilot study, conducted by the National Ageing Research Institute, investigated the 8 weeks Getting Grounded Gracefully program using a pre-test / post-test design method. 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 a randomised trial 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 on 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 aged 55 years or over, living at home, in a retirement village or low care residential aged care facility, have at least one functional impairment (based on Questions 1 to 11 on the Frenchay Activity Index), or had a history of one or more falls in the preceding six months. Participants were also required to be able to stand unsupported for at least one minute and walk short distances indoors (at least 5 metres) without a walking aid. The exclusion criteria included cognitive impairment (<7 on the Abbreviated Mental Test Score, AMTS), inability to understand English (the program was conducted in English), and a marked mobility impairment (unable to walk at least 5 metres 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 two hour balance and function assessment prior to randomisation. Participants were randomised 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 three week period before the classes commenced. All but one follow up assessment was completed in the two 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 40-60 minute sessions per week over an eight 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. Where appropriate (eg had access to a CD player), an audio CD covering any class missed was provided to participants. 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, however 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/from the classes.

Outcome measures

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

1) Questionnaires

a) 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 to 3 points), with a maximum score of 45 points for all 15 items. A higher score indicates greater

frequency of activity being currently undertaken. [Inter-rater ICC= 0.90 (Post & de Witte, 2003).]

b) 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 less the number of activities that have been "stopped" that are rated as less demanding). [HAP adjusted activity score (HAPAAS) – retest ICC= 0.87 (Bilek, Venema, Camp, Lyden, & Meza, 2005).]

c) Quality of life was measured using the Assessment of Quality of Life tool (AQoL; internal consistency – alpha=0.81) (Hawthorne, Richardson, & Osborne, 1999). The AQoL is a 15 item questionnaire with a score range of 0 to 45, with lower scores indicating better health related quality of life.

d) Fear of falling was evaluated using the Modified Falls Efficacy Scale (retest ICC-0.95) (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.

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

2) Clinical measures of balance, gait and function

a) The Four Square Step Test (FSST; retest ICC= 0.98) (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.

b) The Timed Up and Go (TUG; retest ICC= 0.99) (Podsiadlo & Richardson, 1991) involves timing participants standing from a 45cm high chair, walking 3 metres at comfortable speed, turning, then returning to the chair and sitting down.

c) The Step Test (retest – ICC= >0.90) (Hill, Bernhardt, McGann, Maltese, & Berkovits, 1996) involves counting the number of times participants could step one foot fully on and then off a 7.5 cm block step in 15 seconds as quickly as possible. Each leg is tested separately, and performance on the worst side was analysed.

d) Leg muscle strength was measured using the Timed Sit to Stand (3 times) (Tinetti, Doucette, Claus, & Marottoli, 1995) where the speed of standing up and sitting down three times from a 45cm high chair, without use of the arms, is timed. [Timed Sit to Stand (5 times) - ICC= 0.89 (Lord, Murray, Chapman, Munro, & Tiedemann, 2002)].

e) Gait was measured using the Clinical Stride Analyser (CSA, a computerised footswitch system). The distance measured was the central six metre section of a 10 metre 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 where the CSA was not available or malfunctioned, gait velocity was available using a stop watch. [Gait speed and double support – retest ICC= 0.95 and 0.85 respectively (Hill, Goldie, Baker, & Greenwood, 1994).]

3) 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 forwards/backwards directions and the side to side direction with both feet remaining on the ground, at 3 speeds (moderate velocity speed used in analyses); Step Quick Turn - a measure of stability / balance during walking and turning to each side (worse turn time and sway used in analyses); Walk Across Platform – step width while walking at a comfortable speed across the force platform starting one metre 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) – centre 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 [eg mCTSIB & 2 clinical observers- inter-rater ICC= 0.53 – 0.81 for all except eyes open on firm surface (poor to fair), (Loughran, Tennant, Kishore, & Swan, 2005); Limits of stability (time) - retest ICC = 0.88 and Weight shift left/right & front/back - retest ICC= <0.4 (poor) (Liston & Brouwer, 1996); Step quick turn time and sway – inter-rater ICC= 0.78 & 0.88 respectively; retest ICC= 0.70 & 0.72 respectively (Naylor & Romani, 2006)].

A satisfaction survey developed by the authors was completed by participants finishing the Getting Grounded Gracefully program. Several open ended questions were included in the survey. Common themes were grouped together and summarised, 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 0.05, 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 squared tests were used. Pearson r correlations were performed between all measures at baseline to determine level of multi-collinearity between variables. For outcome measures with normal distribution, ANOVA using between groups repeated measures

design was used to compare baseline and post assessment performance between the two groups (control and Feldenkrais group) across all variables. A critical value of $p<0.05$ 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. However, many were ineligible (did not have a fall or any functional impairment), or the day/time of the classes did not suit them, or the venue was too far. Sixty two eligible people were recruited (written consent obtained) and assessed at baseline (Figure 1). Seven (11%) people withdrew from the project prior to the post intervention assessment (four from the control group and three from the intervention group). One additional person was assessed but was found to be ineligible (had a marked mobility impairment). Reasons for withdrawing for 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 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 the paper (local/statewide) (36%) or through Senior Citizen/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 (Table 1 and 2). The majority of participants were female (76%), with a mean age of 75 years and a mean AMTS score of 9.2 (SD 1.0). Participants had a mean number of 4.4 medical problems (current/past) and were taking on average 4.5 medications. Participants reported undertaking three different types of activity per week at the time of commencing the study. Activities were categorised as organised or recreational/non-organised activities (see Table 2). An organised activity was defined as a group or centre/facility based

activity with set times/days undertaken for the main purpose of exercising. A recreational/non-organised activity was defined as an activity undertaken alone or with friends for recreational purposes or an activity with no formal structure (time/day/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 doing any form of organised activity.

Correlations were performed between all baseline measures to determine the level of multi-collinearity between variables. Only one pair of the variables had strong inter-item correlations (>0.80) – this was between the two measures of turning stability – step quick turn time (worst leg), and step quick turn sway (worst leg) – Pearson's r correlation coefficient = 0.81. All other inter-item correlations were lower than 0.80, and most were r values of 0.60 or below. To overcome the issue of multi-collinearity 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% to 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 analysis, differences in performance scores of each group over time (interaction effect) is reported.

Improvements were made by both groups on many of the outcome measures. However, significant interaction effects were evident for two measures - the CSA Gait Speed (p=0.028) and the Modified Falls Efficacy Scale (p=0.003). The intervention group had a 7.8% improvement in their gait speed in the post assessment whereas there was little change in the control group score (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 = 0.056). The intervention group's performance had improved by 3.3% while 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 10% (for the FSST). Eight of these measures had a change difference of 5% or more, with positive trends evident in the Human Activity Profile (p=0.13) and the Step Test [worst leg] (p=0.13).

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=0.05). For variables with a p value of less than 0.2 but greater than 0.05, 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 reinforce 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.

The majority of the 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 the tiredness more to the concentration required "to put it all together". Most participants also reported that the Feldenkrais practitioner met 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 nine other respondents indicated that they probably or maybe would (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 being a change but did not specify the nature of the change. Only three 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 either reported an "improvement" (n=8); or easier/smoother/further movement (n=5); being fitter (n=1);

more relaxed (n=1); or having greater enjoyment (n=1) in relation to either 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/challenging generally or to improve your health/mind (n=4), and a range of specific improvements (eg 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 (eg balance, bend, 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 one 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 the program was beneficial (n=5), enjoyable (n=3), informative (learnt a lot) (n=2) and that the facilitator was very good (eg instructive, understanding) (n=4). Participants were happy and grateful to be involved in the program (n=4) and one participant stated that they would 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 patients and stroke patients (Evans et al., 1997; Palombaro, Craik, Mangione, & Tomlinson, 2006).

The premise that a better understanding of how the body organises 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 report their "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 (intervention group improved by 6% whereas the control group worsened by 10%). Given that a lack of confidence in mobility can often lead an older person to limit their activity, due to 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 may be evident in the future for these participants. A trend was also evident in the Human Activity Profile (HAPAAS) with a 2.6% increase of activity reported in the intervention group compared to 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, and therefore positive changes in these measures could be anticipated from an understanding of the movements focussed on in the Getting Grounded Gracefully program.

Although postural and turning sway and weight shift transfers were also expected to improve (as 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 may include that the selected measures were not the most appropriate measures (although these are difficult constructs to assess), that the program may 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) may not be sufficient time for participants to gain the required level of awareness or to incorporate these adjustments into their automatic repertoire. A review article by Jain et al (2004) that reviewed both the Alexander Technique and 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 that the learning, processing and use of this information varies widely depending on the individual, their motivation, their goals and their 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 have an effect on domains such as postural/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 eight week program. Six participants (and one who withdrew) in the study 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 may be due to 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 their activity levels according to the items assessed on the HAPAAS, so the mechanism of explaining the improved performance on some measures by the control group remains unclear.

Given that the current study was under powered by 22% (15 subjects) based on the original power estimates (70 subjects were required), and that change in scores positively favoured the intervention group on most measures, additional subjects may have produced significant results on more of the outcome measures. Despite a broad range of recruitment strategies, recruitment was slower than anticipated. This may in part be related to a lack of general awareness about the Feldenkrais approach in the broader community. Based on the current study results (for measures with a p value of less than 0.13) between 86-92 subjects would be required to provide sufficient power (alpha of 0.05 and power of 80%) on these measures. Post hoc power analysis for measures with a p value of 0.2 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 for those participants who completed the program. Class attendance was high and drop outs or missed classes were generally due to 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 the majority doing at least one physical activity and on average undertaking three activities (most commonly walking, gardening and heavy housework). However only 15 (27%) people participated in an organised activity. Whether this is due to the cost, the lack of appropriate venues/session dates, or a lack of interest in organised activity generally or in the types of organised 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. The majority of participants found the classes enjoyable and reported a range of benefits as a result of the program.

Similar to other studies, more females than males were recruited to the study therefore the ability to generalise the findings (both in terms of effectiveness and acceptability) to men is limited. Secondly, in terms of acceptability some selection bias may apply, older people who volunteer to take part in an exercise based study may 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 intervention participant surveys suggest that the program may be an acceptable form of exercise for older people. There was a significant change in the intervention group's confidence using the objective Modified Falls Efficacy Scale, and this was supported in the qualitative feedback. A significant change in gait speed, near significant change in the TUG, and a strong positive trend in the Step Test (worse leg), all indicate some improvement was evident in dynamic balance in the intervention group compared to 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 into 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.

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Author Note

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

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	Mean (SD)	75.4 (8.6)	74.4 (7.9)	74.9 (8.2)	
	Range	58 –94	56 - 89	56-94	0.67
Gender % (n)–	Male	15% (4)	31% (9)	24% (13)	
	Female	85% (22)	69% (20)	76% (42)	0.17
Marital Status % (n) –					
	Married	27% (7)	24% (7)	25.5% (14)	0.59
	Widowed	42% (11)	55% (16)	49% (27)	
	Other	31% (8)	21% (6)	25.5% (14)	
Living Arrangements % (n)					
	At home alone	50% (13)	48% (15)	51% (28)	0.90
	At home with family/other	50% (13)	52% (14)	49% (27)	
Number of health problems*					
	Mean (SD)	4.4 (2.2)	4.5 (1.9)	4.4 (2.0)	0.76
	Range	0-9	1-8	0-9	
Number of medications taken					
	Mean (SD)	4.5 (2.5)	4.6 (2.9)	4.5 (2.7)	0.90
	Range	0-9	0-11	0-11	
Human Activity Profile					
Adjusted activity score (AAS)					

Mean (SD)		57.0 (16.9)	55.0 (14.6)	56.0 (15.7)	0.63
Assessment of Quality of life score	Mean (SD)	26.4 (5.1)	26.6 (5.5)	26.5 (5.3)	0.85
Frenchay Activities Index	Mean (SD)	32.5 (7.6)	31.3 (6.8)	31.9 (7.2)	0.54
Abbreviated Mental Test Score	Mean (SD)	9.0 (1.3)	9.4 (0.7)	9.2 (1.0)	0.13
Modified Falls Efficacy Scale		(n=25)	(n=29)	(n=54)	
	Mean (SD)	8.1 (1.4)	8.6 (1.4)	8.4 (1.4)	0.20

* Participants included both previous and current medical problems.

Table 2: Type of activity undertaken at commencement of the study (percentage and number)

	Intervention	Control	All participants
Organised activity	(n=26)	(n= 29)	(n=55)
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 organised 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 organised activity	26.9% (7)	27.6% (8)	27.3% (15)
Recreational/non-organised activity			
Walking	88.5% (23)	93.1% (27)	90.1% (50)
Bowls/Bocci	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)	1.8% (1)
Other recreational/non-organised	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 / non-organised activity	96.2% (25)	96.6% (28)	96.4% (53)

		(n=26)	(n=28)	(n=54)
Average number of physical activities undertaken	Mean (SD)	3 (1.5)	3 (1.4)	3 (1.4)
	Range	0-7	1-8	0-8
(p= 0.93)				

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

Table 3: Balance, function and other clinical measures

Outcome measure		Baseline Assessment Mean (SD)	Post Assessment Mean (SD)	% change	p value*
Human Activity Profile (HAP) (Adjusted score) (HAPAAS) (n=54) HB	Intervention:	57.08 (16.9)	58.58 (14.6)	2.6% better	0.132
	Control:	55.00 (14.6)	53.61 (15.4)	2.5% worse	
Frenchay Activities Index (FAI) (n=54) HB	Intervention:	32.54 (7.6)	33.35 (7.8)	2.4% better	0.521
	Control:	31.32 (7.0)	31.39 (7.2)	0.2% better	
Modified Falls Efficacy Scale (MFES) (n=54) HB	Intervention:	8.13 (1.4)	8.63 (1.6)	5.8% better	0.003
	Control:	8.63 (1.4)	7.73 (1.9)	10.4% worse	
Assessment of Quality of Life (AQOL) (n=50) LB	Intervention:	26.35 (5.1)	26.39 (5.9)	0.2% worse	0.338
	Control:	26.56 (5.6)	25.67 (6.1)	3.4% better	
Four Square Step Test (FSST) (sec) (n=54) LB	Intervention:	15.19 (7.0)	12.37 (3.3)	18.6% better	0.195
	Control:	14.97 (5.3)	13.68 (5.8)	8.6% better	
Timed Up and Go (TUG) (sec) (n=54) LB	Intervention:	12.56 (4.0)	12.15 (2.9)	3.3% better	0.056
	Control:	13.33 (3.5)	14.34 (4.3)	7.0% worse	
Step Test- worst leg (number in 15 sec) (n=52) HB	Intervention:	10.33 (4.0)	11.67 (3.7)	11.5% better	0.129
	Control:	10.07 (3.5)	10.46 (3.8)	3.7% better	

Timed Sit to Stand (TSTS) (3 times) (sec) (n=53) LB	Intervention:	9.97 (3.4)	8.31 (2.4)	16.6% better	0.647
	Control:	11.85 (4.8)	10.56 (4.1)	10.9% better	
CSA Gait Speed (metres per min) (n=54) HB	Intervention:	61.03 (14.0)	66.17 (12.8)	7.8% better	0. 028
	Control:	59.87 (12.7)	59.66 (14.4)	0.4% worse	
CSA Double Support (% of gait cycle) (n=33) LB	Intervention:	35.19 (4.9)	34.52 (6.0)	1.9% better	0.359
	Control:	37.34 (9.0)	35.03 (7.1)	6.2% better	
CTSIB Sway Velocity (Composite) Degrees/sec (n=54) LB	Intervention:	1.33 (0.6)	1.30 (0.6)	2.3% better	0.988
	Control:	1.47 (0.7)	1.45 (0.7)	1.4% better	
Limits of Stability Reaction Time (Composite) – sec (n=54) LB	Intervention:	1.32 (0.4)	1.18 (0.4)	10.6% better	0.813
	Control:	1.27 (0.3)	1.15 (0.3)	9.4% better	
Limits of Stability Maximum Excursion (Composite) -% (n=54) HB	Intervention:	73.92 (12.2)	78.58 (14.4)	5.9% better	0.369
	Control:	71.82 (13.8)	74.61 (15.1)	3.7% better	
Rhythmic Weight Shift - Left/Right (Moderate speed) Degrees/sec (n=50) HB	Intervention:	4.27 (1.4)	4.56 (1.1)	6.4% better	0.200
	Control:	4.43 (1.2)	4.30 (1.0)	2.9% worse	

Rhythmic Weight Shift – Front/Back (Moderate speed) Degrees/sec (n=49) HB	Intervention:	2.56 (0.9)	2.73 (0.8)	6.2% better	0.623
	Control:	2.75 (2.3)	2.68 (0.9)	2.5% worse	
Walk Across Platform – Step Width (cm) (n=46) LB	Intervention:	15.94 (4.3)	15.91 (4.5)	0.2% better	0.494
	Control:	16.78 (3.5)	17.34 (3.1)	3.2% worse	
Step Quick Turn Time (worse of left/right) (sec) (n= 54) LB	Intervention:	2.16 (0.9)	1.67 (0.8)	22.7% better	0.280
	Control:	2.24 (0.6)	1.93 (0.7)	13.8% better	
Stability during Sit to Stand – Weight Transfer (sec) (n=50) LB	Intervention:	0.65 (0.5)	0.41 (0.3)	36.9% better	0. 893
	Control:	0.60 (0.4)	0.35 (0.2)	41.7% better	
Stability during Sit to Stand – Rising Index (% body weight) (n=50) HB	Intervention:	13.00 (5.4)	15.54 (4.8)	16.3% better	0. 806
	Control:	12.19 (5.5)	14.50 (5.1)	15.9% better	

CSA – Clinical Stride Analyser; CTSIB – Clinical Test of Sensory Interaction Balance.

HB – higher score is the better score; LB – Lower score is the better score.

* p value for interaction effect (change over time based on group allocation)

Table 4: Satisfaction survey (closed questions) (percentages and numbers)

Question	Responses	
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)*
	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)

* one participant qualified this response with "depended on the activity, some activities were enjoyed very much"

Figure 1: Recruitment and assessment flowchart

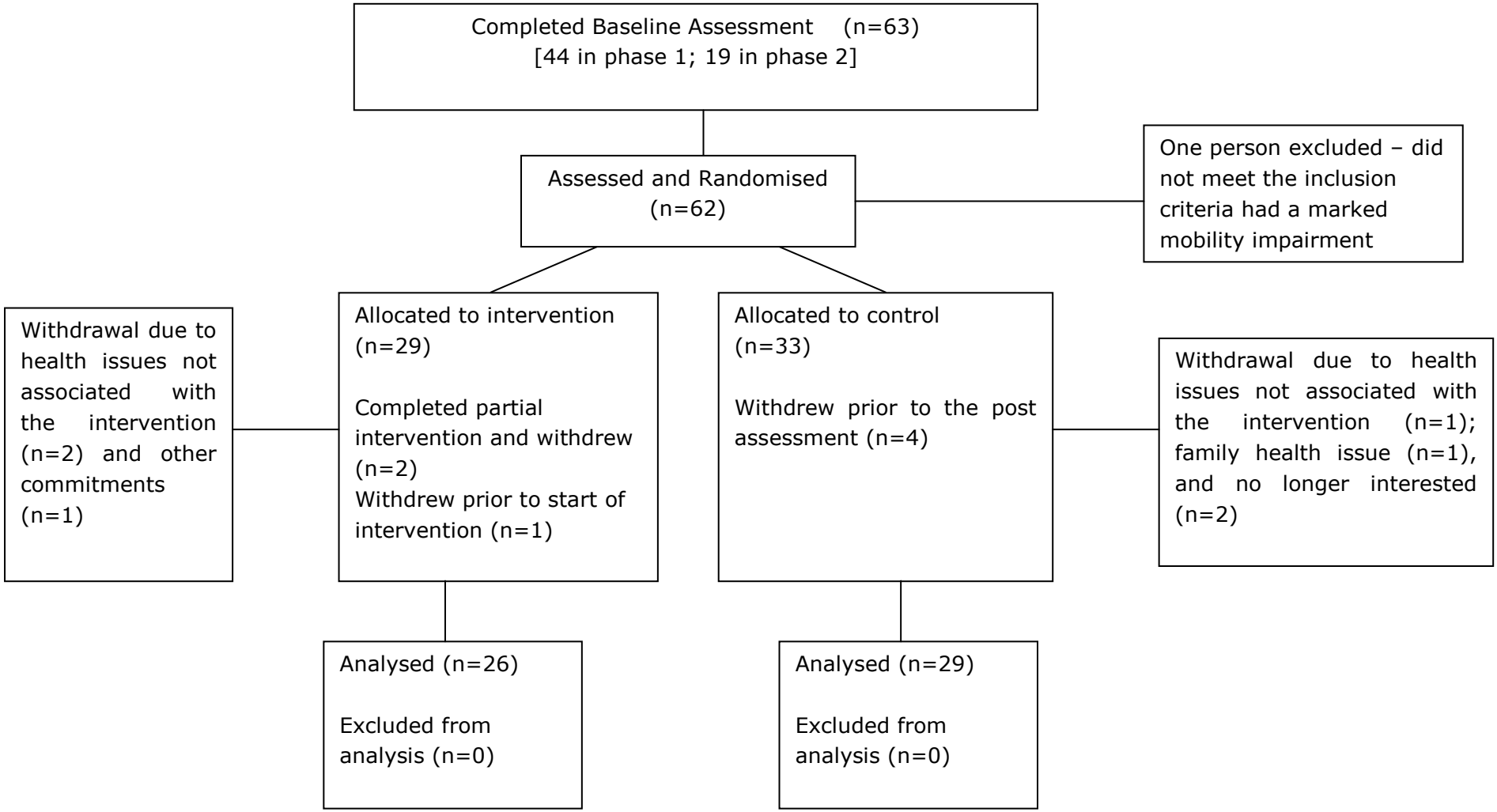
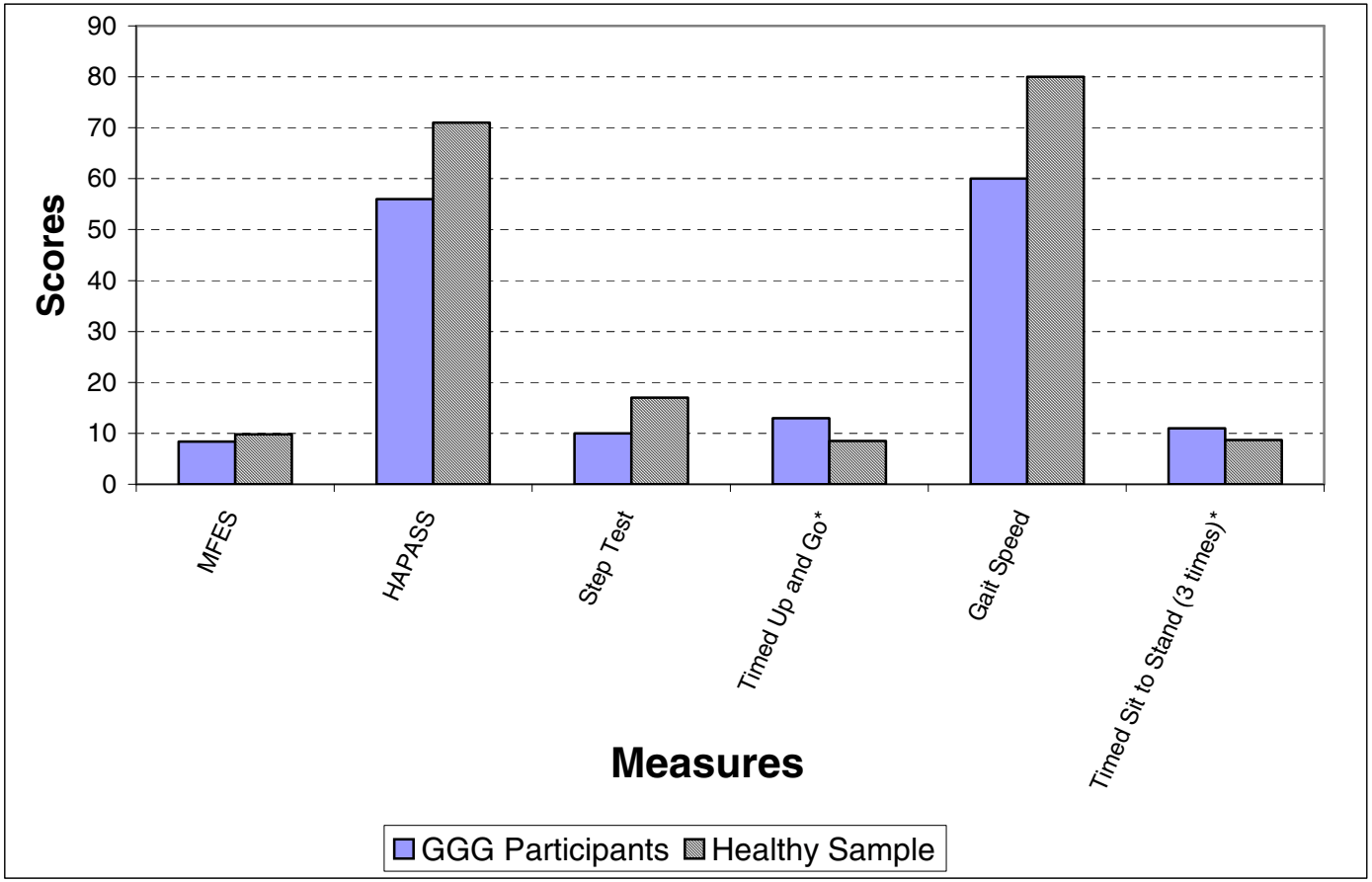


Figure 2: Comparison between the study participants' initial assessment scores with normative data for healthy samples of older people



* Lower scores indicate better performance (Timed Up and Go; Times Sit to Stand)

MFES, HAPASS & Step test- (Hill, Schwarz, Flicker, & Carroll, 1999); Time Up and Go (Podsiadlo & Richardson, 1991); Gait speed - (Steffen, Hacker, & Mollinger, 2002); Timed Sit to Stand - (Tinetti et al., 1995)

GGG – Getting Grounded Gracefully; MFES – Modified Falls Efficacy Scale; HAPASS – Human Activity Profile – adjusted activity score