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Do peers increase participation of older adults in strength training? Pilot randomised controlled trial.

Running title: Peers and Strength Training: Pilot RCT

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Do peers increase participation of older adults in strength training? Pilot randomised controlled trial.

Abstract

Fewer than 20% of older adults participate in strength training (ST). Barriers to ST participation include not knowing where to go, or not having someone to go with. To address these barriers we provided older adults with a peer (older person already participating in ST) to support their engagement. The aim of this pilot randomised controlled trial was to determine whether older adults who were provided with a peer when participating in ST were more likely to be participating in ST 4-weeks post-intervention, compared to those receiving ST alone. Fifty-one ST participants were recruited, 40 completed the intervention and post-intervention data collection (78.4%). Providing peer support with ST did not significantly increase ST participation (p=0.775). However, both groups made significant improvements over time in lower limb strength and mobility. Participants in either group who continued the ST program (55%) had made additional significant improvements in lower limb strength and mobility.

Keywords

Resistance training, seniors, mentor, buddy, older adults

The proportion of older populations around the world are increasing and this is placing additional stress on health care systems. As people age there is a tendency to decrease the amount of physical activity they are participating in and increase their sedentary behaviour. The World Health Organisation and many first world countries provide physical activity guidelines for older adults (Australian Government Department of Health, 2016; Canadian Society for Exercise Physiology, 2012; United Kingdom Department of Health, 2011; World Health Organisation, 2011) in an effort to make it easier to understand how much and what type of physical activity older people need on a regular basis in order to gain health benefits. Reported physical and mental health benefits from being physically active include decreased risk of cardio vascular disease (Soares-Miranda, Siscovick, Psaty, Longstreth, & Mozaffarian, 2016), improved quality of life(Brown, Carroll, Workman, Carlson, & Brown, 2014) and physical function (Almeida et al., 2014; Hillsdon, Brunner, Guralnik, & Marmot, 2005), decreased cognitive decline (Sofi et al., 2011), and reduced mortality rates (Hupin et al., 2015). Many of the physical activity guidelines for older people recommend 30 minutes per day of moderate-intensity physical activity such as walking (puffing pace), cycling and swimming and a minimum of two sessions a week of strength training and three of balance training, such as balance specific training or Tai chi (Canadian Society for Exercise Physiology, 2012; Sims, Hill, Hunt, & Haralambous, 2010; U.S. Department of Health and Human Services, 2018; World Health Organisation, 2011).The US Physical Activity Guidelines for older people also recommend 8 to 12 repetitions per set to improve muscle strength and that two or three sets per session be undertaken (U.S. Department of Health and Human Services, 2018).

Strength training has additional health benefits to those attributed to just being physically active, such as increasing muscle mass and strength, bone mineral density, functional independence, improved arthritis symptoms, reduction in sarcopenia and signs and symptoms of chronic illness (Liu & Latham, 2009, 2011). Similarly, balance training can reduce falls risk (Sherrington et al., 2019). Strength and balance training is particularly good for older adults, yet fewer than one in five people

aged 60 years and over regularly participate, and as age increases the proportion participating in strength and balance training reduces markedly (Bennie et al., 2016). Studies in the United States of America (National Center for Health Statistics, 2015), Australia (Humphries, Duncan, & Mummery, 2011; Merom et al., 2012), and Germany (Mayer et al., 2011) show strength rates between 5-15% for a minimum of twice weekly participation.

A recent systematic review that examined factors influencing older adults to participate in strength training, identified over 90 reasons that motivated participation, including improved physical and mental health, improved wellbeing, and preventing deterioration, with only 24 identified barriers, including poor health, risk of injury, pain and a fear of looking too muscular (Burton, Farrier, et al., 2017). Others have reported that lack of social support, time, knowledge and a lack of age-appropriate programs were also viewed as barriers (Bopp, Wilcox, Oberrecht, Kammermann, & McElmurray, 2004), while having social support has proven beneficial in other health programs such as falls prevention (Khong, Bulsara, Hill, & Hill, 2016), In these programs that include social support, peers (i.e. older people with knowledge and experience in the area of interest) have been linked to a person or people who have limited experience or knowledge in an area, particularly health. The aim of linking a novice with a peer is to provide an atmosphere where like-minded people can work together to improve the experience for the novice, while the peer gains benefits too, usually in helping and empowering others (Watkins, Burton, & Hill, 2019).

Another recent systematic review examined the effectiveness of peers in delivering exercise programs or motivating older people to increase their physical activity (Burton et al., 2018). Of the 18 included studies (6 randomised controlled trials), 16 reported improvements in physical activity levels or function, however the meta-analysis favoured the control group for six-minute walk test and timed-up-and-go (Burton et al., 2018). The six-minute walk test is used to determine whether aerobic endurance has changed and the timed-up-and-go balance and mobility. It must be noted that only two interventions were conducted within or partly in the home Iliffe et al., trained peer

mentors who visited participants at home to support them to undertake the Otago Exercise Program (compared to an intervention delivered in a community centre and a control group receiving usual care) (Iliffe et al., 2014). A 2% point increase (not significant) in moderately-vigorous physical activity was reported for the Otago Exercise group after 12 months (Iliffe et al., 2014). The other study evaluated the Physical Activity for a Lifetime of Success (PALS) program, which used a telephone motivational support program to increase physical activity (Hammerback, Felias-Christensen, & Phelan, 2012). However there were many recruitment issues and the intervention was also not specifically targeted at increasing strength and balance but overall physical activity (Hammerback et al., 2012). An increase in physical activity levels was found between baseline and follow-up where 13 people at baseline were meeting the physical activity guidelines and this increased to 25 people at follow-up (Hammerback et al., 2012).

In summary, there are few studies attempting to increase participation in strength training programs delivered at home, with the assistance of a peer for motivation, with the intent to encourage longer term participation either at home or at a gym. The aim of this study was to determine whether older adults who were not participating in strength training and were linked with a peer for motivation and support were more likely to participate in a strength training program at least 4-weeks post-intervention compared to those receiving only a strength training program in their home.

Method

Trial Design

A pilot randomised controlled trial (RCT) was conducted over 12-weeks (intervention period) with a 4-week follow up (post-intervention period). The trial was registered with the Australian and New Zealand Clinical Trials Registry (ACTRN blinded for review).

Participants

Eligible participants (i.e. strength training participants and peers) were aged 60 years and over, able to speak and write English, had no medical conditions preventing them from participating in a strength training program and no diagnosis of dementia. Peers also needed to have participated in two months of strength training at an exercise facility prior to recruitment to be included.

Recruitment

Strength training participants.

Older adults who had not participated in strength training and lived within the Perth (Australia) metropolitan area were recruited between June and November 2018. Recruitment methods were via e-newsletters sent regularly through a senior's organisation and a falls prevention organisation to its members. The falls prevention not-for-profit organisation was an advocacy agency and did not deliver strength and balance training programs. They did, however allow recruitment through their falls prevention presentations, which were delivered across the Perth metropolitan area. A large part of the falls prevention presentations was discussing the evidence showing the benefits or strength and balance training to reduce falls. At the completion of each presentation attendees were asked if they would like to receive information about participating in the research project and for those interested to provide their contact details. The research assistant then contacted each person by phone, explained the research project and screened for eligibility. Interested and eligible people were posted a participant information sheet and consent form and were told a physiotherapist would contact them within a few weeks.

Peers.

The peers were recruited at the same time as the strength training participants but were identified through exercise centres that focused on older adult strength programs. The lead researcher attended multiple classes at four centres and described the research project to potential peers. Those expressing interest provided their contact information and were given a consent form and

participant information sheet. Each eligible peer was then contacted, to confirm interest in participating and a date for their peer training was set.

Matching of Strength Training and Peer Participants

It was important to recruit peers who attended strength training programs within close vicinity to the strength training participants' homes and preferably in strength programs that were specifically designed for older adults. The reason for this was to encourage strength training participants to join seniors exercise programs where the peers were participating in their twice-weekly strength training sessions at the completion of their in-home strength training program. It was possible to link these two because almost all of the recruitment came from falls prevention presentations held in retirement villages or meetings of groups in halls in the proximity of where people were living.

Randomisation and Blinding

Participants were randomly assigned to one of two groups using equal randomisation (i.e. 1:1 for the two groups; peer support, control). A statistician external to the research project generated the allocation sequence using a computerised random number generator in Stata 15 (StataCorp, College Station, TX) and placed it in opaque sealed envelopes. The allocation sequence was concealed from the research assistant and physiotherapists by the Project Lead who did not have any contact with the strength training participants. After a strength training participant provided written consent to participate the project lead provided the physiotherapists with contact details of the participant. The physiotherapists were asked to assess their allocated strength training participant (baseline and post-testing) and then deliver the strength training program. The Project Lead also then opened the next sequentially numbered opaque envelope in order and contacted the research assistant if a peer was required to be linked with the strength training participant. The physiotherapists were blinded to whether the strength training participant was allocated a peer or was in the control group. It was

not possible to blind the participants because they knew if they had a peer or not. Participants were asked to not disclose to the physiotherapist whether they were receiving peer support.

Intervention

Strength training program.

Participants in both groups undertook their strength training program in their home. The program was delivered for 12-weeks and participants were encouraged to complete the exercises a minimum of twice weekly. Two experienced physiotherapists assessed each participant and provided them with their initial program of exercises. The individually tailored exercises were given to each exercise participant in a folder. In general, each exercise participant was asked to complete 6-7 strength exercises (including upper and lower body) and 3-4 balance exercises twice a week. Exercises were individually tailored for each exercise participant, which was dependent on results of the assessment (ie upper and lower body strength, balance and mobility), current injuries or pain. Participants were provided with dumbbells (0.5-5kgs), ankle weights (1-3kgs) and therabands (light, medium and strong). Participants were also asked to complete a diary each time they completed the exercises, including what exercises they undertook, how many sets and repetitions they completed, what weights were used for each exercise and whether any adverse events or issues arose during each session. The physiotherapists returned to monitor and adjust each program accordingly at week 4 and 8 and finally at (week 12). At the final visit the physiotherapist provided information to every strength training participant about how to continue to participate in strength training either at home or at a nearby centre.

Peer support.

Participants randomised into the intervention group received peer support. Peer support consisted of linking an older person who was already participating in a strength training program at an exercise facility at the time of recruitment (the peer participant) to an older person who was not participating

in strength training (the strength training participant). Peers attended a three-hour peer training program. Most peer training programs were held in groups, with only two peers individually trained due to not being able to attend any of the group peer training sessions. Each peer was given a guidebook for peers to increase participation in strength training manual. The training consisted of information about peers being role models, benefits of strength training for older people (ie physical, mental and emotional), behaviour change techniques, impact as a peer, supportive behaviours, the role of a peer and motivators and barriers to participating in strength training.

The peers initially met face-to-face with their randomly allocated strength training participant in a public setting (such as a coffee shop) and from then on were provided with the option to phone (or text), email or link up face-to-face depending on what was agreed on by each peer and strength training participant. The weekly contact included asking how the strength training was going, whether they had completed two sessions for the week, whether they had any issues or difficulties with the exercises, and whether they were noticing any differences to their body or health (over time). Towards the end of the 12-week intervention, peers were encouraged to talk about their experiences at their exercise centre program and to encourage their strength training participant to consider attending a session or joining the strength training program. The peers were asked to complete a diary including type of communication, length of call, topics discussed and whether they enjoyed being a peer for that day and the reasons why they answered as they did. During the 12-week intervention the peers also participated in a focus group to share their experiences, answer any questions they had, and to emphasise the importance of encouraging ongoing strength training for their participant.

Outcomes

The primary outcome was the proportion of participants continuing in a strength training program 4-weeks after the 12-week intervention was completed. Continuation in a strength training program was defined as participating in strength training at least twice a week. This was measured by

phoning people 4-weeks after the intervention ceased to determine whether they had continued twice weekly participation.

Secondary outcomes were: functional mobility measured using the Timed-Up-and-Go (TUG) (Podsiadlo & Richardson, 1991); and 6-minute walk test (Rikli & Jones, 1998); lower limb strength using 5 times sit-to-stand test (Jette et al., 1999); balance using the functional reach test (Duncan, Studenski, Chandler, & Prescott, 1992; Duncan, Weiner, Chandler, & Studenski, 1990); timed tandem walk (Guralnik et al., 2000); hand grip strength test (Roberts et al., 2011); health-related quality of life using the EQ5D-5L (Herdman et al., 2011; Janssen et al., 2013); and the outcome expectations for exercise scale (OEE) which includes 9 questions (5 point Likert scale), where a low score indicates low outcome expectations of exercise (Resnick, 2005; Resnick, Luisi, Vogel, & Junaleepa, 2004). The functional assessments were chosen to provide an understanding of how the strength training program (and to a lesser degree balance exercises) affected important functional requirements of older people to continue living independently. For example, strength is required to get in and out of a chair/off toilet, mobility is needed to move around the house, endurance is necessary to walk outside the home, and balance assists in reducing the risk of falls. All secondary outcomes were measured at baseline and at 12-weeks by the physiotherapist conducting the strength training program. Demographic and health data such as age, gender, education level, chronic illnesses, walking ability and falls history in the past 12 months were also measured at baseline.

Sample Size

The sample size for this pilot study was set at 13 peers (ratio: 1 peer to 2-3 strength training participants) and 50 strength training participants (25 per group). It was expected that this would be sufficient to demonstrate the feasibility of the intervention and to calculate effect sizes for a fully powered randomised controlled trial into the effectiveness of the intervention that would also enable a full economic analysis.

Data Analysis

Data were analysed using Statistical Package for the Social Sciences version 25 (SPSS Inc, Chicago, IL, USA). Continuous data were initially examined to determine normality of distribution and where necessary non-parametric tests were utilised. Outcome data were compared using intention-to-treat (ITT) analysis. For the primary outcome a chi-squared test was used to determine difference in (continued) participation 4-weeks post-intervention between the two groups. Paired *t*-tests (where appropriate) were utilised to determine improvements (if any) in each group (i.e. peer support, no peer support). For each variable, we then measured the change that occurred between baseline and post-testing, by subtracting baseline from 12-week values. Independent *t*-tests were used to compare changes between baseline and 12-weeks continuous variables. Chi-squared analyses were used for categorical data. Post hoc analysis was undertaken to examine the reasons for attrition, regardless of treatment group (ie those who continued to participate in strength training versus those who did not). The Cramer's V test was used to calculate the effect size of the primary outcome to assist with calculating a sample size for a fully powered future RCT. Statistical significance was considered at $p \leq 0.05$.

Ethics Approval

Ethics approval was obtained from the University of Notre Dame Australia Human Research Ethics Committee (018012F) prior to commencement of the study. All participants provided written informed consent prior to participating.

Results

Participants

Figure 1 shows the participant flow through the study. A total of 62 people were assessed for eligibility with 51 subsequently randomised to either the intervention (n=26) or control (n=25) groups. Five intervention group participants withdrew during the study and were therefore unable

to complete post data collection. Another four withdrew during the study period due to sustaining an injury because of a fall (n=2), ill health (n=1) and spouse being moved into residential aged care (n=1). None of the withdrawals ascribed to participating in the strength training program.

Baseline Data

Baseline participant demographic and health data for those who completed baseline and follow up data collection for each group is shown in Table 1. There were no statistically significant differences between those who withdrew and the intervention and control participants at baseline, except for age (participants: 77.8 (±7.4) years versus withdrawals: 83.6 (±7.6) years, p=0.025). Overall, there were 35 (87.5%) females and five (12.5%) males who participated. There were no differences between the intervention and control groups at baseline.

Table 1.

Participant Demographics

Variables	Intervention group (ST plus Peer support) n=21	Control group (ST alone) n= 19
Age (years), mean (SD)	78.2 (7.6)	77.4 (7.3)
Sex n (%)		
Female	19 (90.4)	16 (84.2)
Male	2 (9.6)	3 (15.8)
Marital status n (%)		
Married	14 (66.7)	10 (52.6)
Widowed	5 (23.8)	6 (25.0)
Divorced/separated	2 (9.5)	3 (15.8)
Living status n (%)		
Alone	6 (28.6)	9 (47.4)
With spouse/partner	14 (66.7)	9 (47.4)
With children	0 (0.0)	1 (5.3)
With someone else	1 (4.8)	0 (0.0)
Current smoker n (%)		
No	21 (100.0)	19 (100.0)
Chronic illness n (%)		
Cardiovascular disease	9 (42.9)	8 (42.1)
Respiratory disease	5 (23.8)	3 (15.8)
Spinal issues	13 (61.9)	10 (52.6)
Osteoporosis	9 (42.9)	7 (36.8)
Hearing impairment	8 (38.1)	5 (26.3)
Vision impairment	21 (100.0)	18 (94.7)
Diabetes (Type 1 or 2)	3 (14.3)	5 (26.3)
Cognitive impairment	3 (14.3)	0 (0.0)
Neurological condition	2 (9.5)	6 (31.6)
Walking status n (%)		
No trouble walking	11 (52.4)	9 (47.4)
Some trouble but does not use an aid	6 (28.6)	6 (31.6)
Uses stick or frame outside	3 (14.3)	4 (21.1)
Uses stick or frame inside	1 (4.8)	0 (0.0)
Falls in past year Yes n (%)	5 (23.8)	8 (42.1)

Note. ST is strength training, participants could have more than one chronic illness

Outcomes

The primary outcome showed the peer support intervention had no effect in encouraging older adults to continue participating in strength training with 12 of the 21 (57.1%) intervention

participants (i.e. had a peer) continuing strength training through to 4-weeks post-testing compared to 10 of the 19 (52.6%) control participants (X^2 (1, N=40) = 0.082, p=0.775). Overall, 55% (n=22) of the older adults who completed the strength training program continued to participate, all in their home, for at least a month after the physiotherapists had completed their visits and other (secondary outcome) post-data collection. Based on these findings, the sample size for a fully powered RCT with an effect size of 0.045, 80% power and 5% alpha was estimated to be 1,963 per group or 3,926 in total.

Table 2 presents the baseline and post-test intervention results (12-weeks) and the change between groups' scores. The intervention group had significant pre-post within group differences for lower limb strength (sit-to-stand 5 times; time improved 1.4 (±1.9) seconds) and functional mobility (TUG; time improved 1.3 (±1.3) seconds); six minute walk test (distance increased 36.3 (±44.2) metres). The control group also showed significant pre-post changes within group differences in functional mobility (TUG; time improved 1.5 (±2.2) seconds) and 6 minute walk test (distance improved by 25.2 (±42.2) metres). In addition the control group improved in the OEE overall score (improved by 0.5 (±0.9)), and EQ5D-5L health today score (improved by 7.1% (±14.5%)). The intervention group reported significantly worse outcome expectations of physical activity particularly for the question "Is an activity I enjoy doing."

Table 2.

Change in secondary outcomes over time within intervention and control group and between groups

Variables	Intervention group (Peer support) n=21					Control group n= 19					Change between groups				
	Baseline	Post-test	t score	95% CI	P-value	Baseline	Post-test	t score	95% CI	P-value	PS	Control	Z or t score	95% CI	P-value
Functional Reach (cm)	30.1 (7.0)	32.5 (7.4)	-1.77	-5.31, 0.43	0.092	29.5 (6.7)	30.3 (7.7)	-0.48	-3.90, 2.45	0.638	2.4 (6.3)	0.7 (6.6)	0.84	-2.41,5.84	0.406
Sit to Stand - 5 times (s)	12.5 (3.3)	11.1 (3.0)	3.46	0.56, 2.28	0.002	13.6 (4.4)	12.3 (4.9)	1.13	-1.12, 3.75	0.272	-1.4 (1.9)	-1.3 (5.1)	0.09	-2.50, 2.29	0.929
Timed Up and Go (s)	9.6 (3.0)	8.3 (2.3)	4.71	0.75, 1.95	<0.001	10.2 (3.6)	8.8 (2.0)	2.89	0.41, 2.57	0.01	-1.3 (1.3)	-1.5 (2.2)	-0.238	-1.03, 1.30	0.813
6 Minute Walk Test (m)	355.4 (103.6)	391.8 (113.4)	-3.67	-57.04, -15.63	0.002	382.5 (91.5)	407.7 (107.8)	-2.6	-45.59, -4.89	0.018	36.3 (44.2)	25.24 (42.2)	0.8	16.99, 39.19	0.429
Timed Tandem Walk (s)	18.0 (8.0)	14.6 (4.6)	1.95	0.24, 7.01	0.066	16.5 (6.9)	14.5 (7.0)	1.43	-0.97, 5.10	0.171	-3.4 (8.0)	-2.1 (6.3)	0.58	-5.96, -3.30	0.581
Timed Tandem Walk Errors	4.3 (5.0)	3.3 (4.0)	2.11	0.01, 1.99	0.047	5.8 (5.1)	3.6 (4.2)	2.71	0.49, 3.83	0.014	-1.0 (2.2)	-2.2 (3.5)	-1.28	-0.67, -2.99	0.209
Handgrip Test (kgs)	19.7 (6.1)	20.2 (6.2)	-0.952	0.62, -0.95	0.353	21.6 (8.5)	22.1 (8.6)	-0.67	-1.95, 1.00	0.509	0.5 (2.5)	0.5 (3.1)	0.57	1.74, 1.84	0.955
OEE Overall Score	1.96 (0.63)	2.13 (0.73)	-0.913^	-0.58, 0.23	0.373	2.41 (0.84)	1.92 (0.70)	2.26^	0.03, 0.95	0.037	0.2 (0.9)	-0.5 (0.9)	2.3	0.80, 1.26	0.027
EQ5D-5L Health Today	79.6 (13.8)	77.4 (15.0)	0.651	-4.83, 9.21	0.522	73.9 (12.9)	81.0 (9.8)	-2.13	-14.12, -0.09	0.047	-2.2 (15.4)	7.1 (14.5)	1.95	-0.33, 18.89	0.057

Note: cm is centre metres, s is seconds, m is metres, kgs in kilograms, PS is peer support intervention.

When comparing the change scores (pre-test minus post-test) between the intervention and control groups the only measure to show a significant difference between the groups was for the OEE overall score ($t(36)=-2.30$, $p=0.027$). This showed that the control group had improved outcome expectations for physical activity more than the intervention group between baseline and post-testing (see Table 3 for full results). The EQ5D-5L health today score was also trending towards a difference between groups from baseline to post-testing. Little difference was found between groups when comparing change between baseline and post-testing for the physical outcome measures.

With over half of the participants continuing to participate in strength training 4-weeks after the cessation of the intervention, differences in the secondary outcome variables were analysed. Table 4 shows the changes between baseline and post-testing for those who continued to participate and those who did not. Significant differences were found for lower limb strength (sit-to-stand 5-times test (approximately 2.8 seconds difference in completing the task between groups)) and also mobility (6 minute walk tests (those continuing to participate in strength training walked on average 28.6 metres further than those who did not participate)).

Table 3.

Change in secondary outcomes over time between participants from either group who kept participating in strength training for a further 4 weeks with participants who ceased participation at 12 weeks

Variables - change scores	**Continuing RT (n=22)**	**Not continuing RT (n=18)**	**t score**	**95% CI**	**P-value**
Functional Reach (cm)	2.3 (6.2)	0.8 (6.8)	0.70	-2.73, 5.59	0.490
Sit to Stand - 5 times (s)	-2.6 (3.1)	0.13 (3.9)	-2.47	-4.97, 0.49	0.018
Timed Up and Go (s)	-1.8 (1.8)	-0.9 (1.7)	-1.51	-1.99, 2.88	0.139
6 Minute Walk Test (m)	43.4 (41.3)	14.8 (40.9)	2.16	1.73, 55.56	0.038
Timed Tandem Walk (s)	-0.9 (4.3)	-5.0 (9.2)	-1.74	-8.99, -0.76	0.094
Timed Tandem Walk Errors	-2.1 (3.3)	-0.9 (2.1)	-1.32	-3.04, -0.63	0.193
Handgrip Test (kgs)	0.4 (3.1)	0.6 (2.4)	0.23	-1.59, 2.00	0.821
OEE Overall Score	-0.1 (0.5)	-0.2 (1.3)	-0.09	-0.67, -0.61	0.925
EQ5D Health Today	5.4 (11.8)	-1.7 (18.8)	1.45	-2.79, 16.94	0.155

Note: cm is centre metres, s is seconds, m is metres, kgs in kilograms.

Discussion

This pilot RCT showed that providing a peer had no effect compared to having no peer in encouraging older adults to continue participating in a strength training program after the health provider input ceased. The peers themselves were participating in strength training programs specifically targeted at assisting older adults, called the Living Longer Living Stronger program. The centres where the Living Longer Living Stronger programs were located were in close proximity to each new exercise participant (i.e. within <10km, due to recruitment by presentation in that vicinity). These were purposeful strategies because research has shown that barriers to participating in strength training programs for older adults include too far to travel, don't know where to go and no one to go with (Burton, Farrier, et al., 2017; Burton, Lewin, et al., 2017). However, having a person familiar with the facility and program (i.e. the peer) and living in close proximity to the centre appears to not be enough to encourage any exercise participant to begin attending a strength training program outside their home. The 22 participants that did continue at home purchased dumbbells and ankle weights on the advice of the physiotherapist so that they could continue with the program set. This is supported by a study which found that older people prefer choice when thinking about participating in strength and balance training and that some do not like to attend gyms (Yardley et al., 2008).

Iliffe et al.'s strength training program also included peer mentors assisting older adults in their home and was conducted for 24-weeks, after which they determined whether the group were still meeting the physical activity guidelines of 150 minutes of moderately-vigorous physical activity (MVPA) 12 months later (Iliffe et al., 2014). Their home based peer-led intervention also did not find a significant change compared to usual care, however the group program held weekly in a community centre did find a significant difference in MVPA and a reduction in falls (Iliffe et al., 2014). One possible interpretation of these results may be that training conducted within the home,

by peers or by a health professional with support from a peer, with the aim of having ongoing sustainable strength training participation, is perhaps not as successful as interventions delivered at centres by health professionals. However, a large meta-analysis found that strength based training is effective, whether done at home or in the gym if intensive enough (Liu & Latham, 2009).

The findings from this study that peers meeting the exercise participant face-to-face initially and then contacting them by phone weekly to build a rapport, motivate them and then in approximately weeks 9-11 of the intervention encourage them to participate in a strength training program specifically targeted at older people near their home, does not appear to be the most effective method for encouraging older people to participate in strength training at a facility on an ongoing basis. This is reflected in the estimated sample size for a fully powered RCT that we calculated to consist of 1,963 in each group based on this study's effect size. Thus, any future research should consider changes to the current protocol such as commencing in the strength training program at the facility immediately or linking older participants with their spouse/partner or a friend to participate in the intervention rather than linking them with someone they did not know (ie peer with experience in strength training). It may be that having a strength training partner that they know is more effective in encouraging long term strength training participation due to having things in common through past history and both motivating each other to participate. Other changes to the intervention which may be more successful are more or including only face-to-face sessions or having a longer and more intense intervention so more participants notice positive health changes.

The physical outcome results however, did show within group improvements across multiple tests. The intervention group (peer support) significantly improved their lower limb strength (sit-to-stand 5 times), mobility (TUG), endurance (6 minute walk test) and ability to perform dynamic balance more proficiently (reduction in tandem walk errors). Whereas, the control group improved on each of these, except the sit-to-stand 5 times test. With a mean age of 77.8 (±7.4) years these results show it is possible to improve physical function outcomes with strength training regardless of

age. These findings support Liu et al.'s (2009) Cochrane review which reported strength training significantly improved physical ability (SMD: 0.14, 95%CI 0.05,0.22), ability to get out of the chair (SMD: -0.94, 95%CI: -1.49,-0.38) and improved muscle strength (SMD: 0.84, 95%CI: 0.67, 1.00). It should be noted that utilising a physiotherapist within the home for only three sessions over 12-weeks was enough to find significant increases for this older population. In Australia, many older adults are eligible for up to five free sessions of allied health (including physiotherapy) per year as part of a care plan. This intervention has shown it may be possible to spread these five sessions out across the year in order for a strength training program to be re-assessed every few months to maintain motivation and show the older person that they are continuing to improve, regardless of their age.

Significant differences were found between those who continued longer term participation (when combining the two groups) compared to those who did not continue for the sit-to-stand 5 times and the 6 minute walk tests. Both of these tests measure critical aspects for older adults continuing to live independently as they age. In order to get out of a chair to prepare a meal or get off the toilet by oneself it is necessary to be able to get up independently. To continue to shop, or hang clothes on an outdoor line it is much easier to be able to walk without an aid (in order to carry bags or a basket). Improving mobility over time will assist with these daily tasks rather than experiencing a decrease in mobility and possibly ability to complete these tasks, which may be the case for the group that did not continue participating.

Limitations

This was a pilot RCT designed to test a novel intervention (i.e. peer support) and to identify effect sizes for a larger adequately powered RCT and economic analysis. The recruitment of the required number of participants and peers for this study was a strength, as was the study cohort including 87.5% females who traditionally do not participate in strength training. However, a change in the peer intervention and how it is administered will be required before a larger study can be

considered. Future research should also explore the peer experience, in particular potential burden associated with being a peer to multiple older adults, and potential strategies to minimise this. The physiotherapists were blinded to the intervention at baseline but there is a likelihood that participants spoke of their peer at the follow-up sessions. The physiotherapists however did not make the final phone call about whether participation in strength training had continued (ie primary outcome). This was made by the research assistant who had recruited all exercise participants, therefore should not bias the results.

Conclusion

This study found that peer intervention was not effective in increasing longer term participation in strength training programs in older people. This home delivered strength training program did however significantly increase physical function irrespective of whether a peer support was used, including leg strength, mobility and endurance. Also of note, was that 55% of all participants continued to participate even after they knew the physiotherapist was no longer assisting or reviewing them, resulting in increased lower leg strength and greater mobility than those who did not continue. There is potential that a physiotherapy led strength training program for older adults could be maintained at home, however further research is required to better understand the potential and sustainability of this type of intervention.

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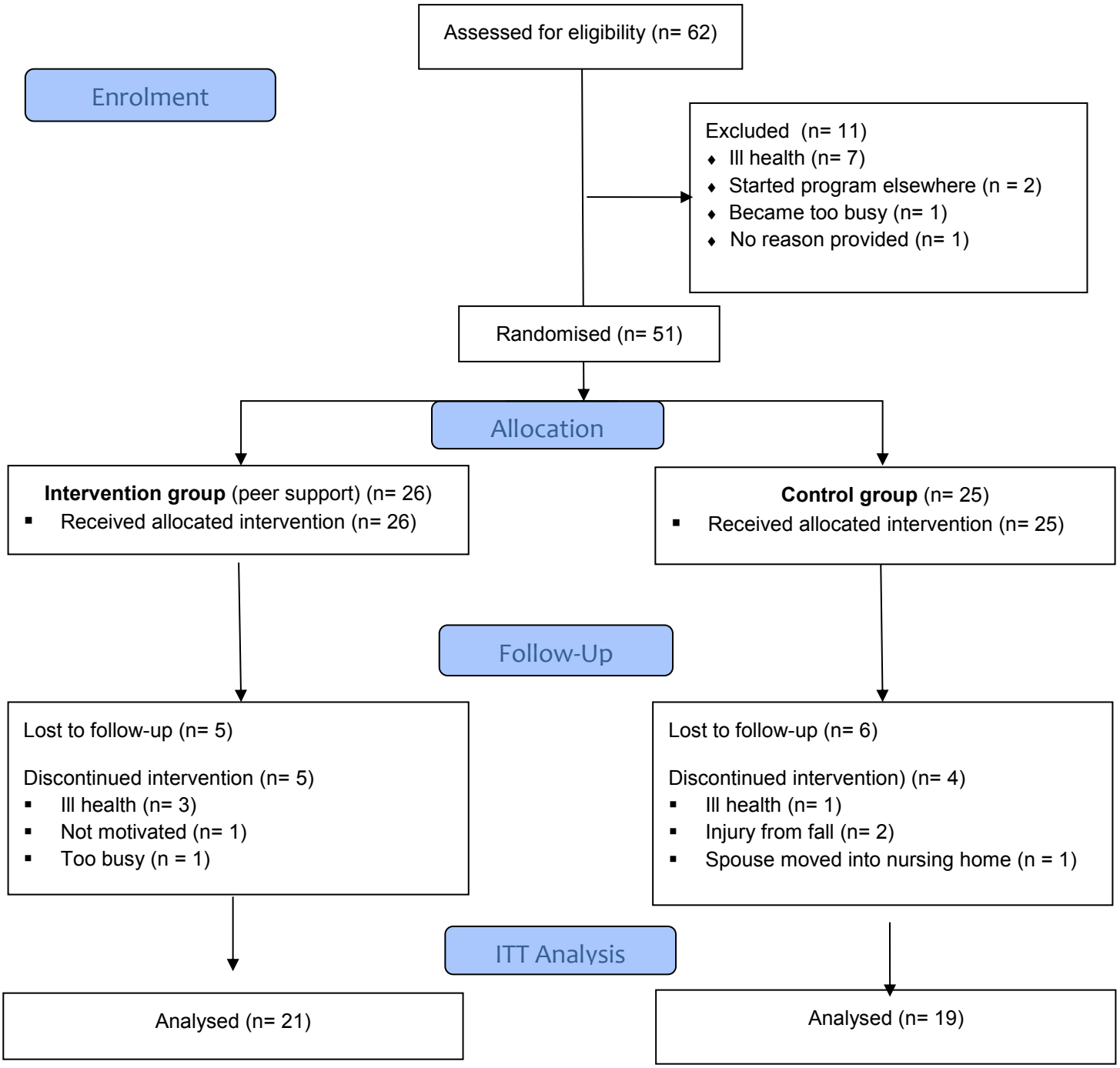

***Figure 1*. Study Flow Chart**