

Long-term Benefits of a Lifestyle Exercise Program for Older People Receiving a Restorative Home Care Service: A Pragmatic Randomized Controlled Trial

Elissa Burton^{1,2}, Gill Lewin^{1,2}, Lindy Clemson³ and Duncan Boldy⁴

¹Faculty of Health Sciences, Curtin University, Perth, Western Australia, Australia. ²Research Department, Silver Chain, Perth, Western Australia, Australia. ³Health and Work Research Unit, The University of Sydney, Sydney, New South Wales, Australia. ⁴School of Nursing and Midwifery, Curtin University, Perth, Western Australia, Australia.

ABSTRACT: Restorative home care services are short term, individualized programs aimed at maximizing an older person's ability to live independently and maintain their function. The services are made up of a number of components, including an exercise program to increase and maintain function of the older person. The aim of this study was to examine over the longer term, the effectiveness and maintenance of a (modified) lifestyle functional exercise program (LiFE) compared to the current, structured exercise program used in a restorative home care service. A pragmatic randomized controlled trial was employed with two study arms: LiFE (intervention) and a structured exercise program (control). Data were collected at baseline, post-intervention (eight weeks) and six months. No difference between the groups for exercise adherence was found. The LiFE group showed significantly better progress for 25% of the outcomes compared to the structured exercise group over the six months. Community and health care organizations delivering restorative home care services should consider this lifestyle exercise program for their clients. It is particularly appropriate for those older people who are not interested in structured types of exercise, those who will not keep using weights to offer resistance, or those who suggest they have limited time.

KEY WORDS: aging, physical activity, restorative home care services, rehabilitation

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CORRESPONDENCE: e.burton@curtin.edu.au

Introduction

Population growth throughout the world has increased rapidly over the last few decades, and Australia, like many other Western countries, is looking at how best to address the challenges of population aging. Over one million older Australians receive home care services each year,¹ and that number is expected to rise as people aged 65 years and over are estimated to make up 23% of the Australian population by 2056, compared to 13% in 2007.² A similar circumstance is expected in other Western countries also.

Due to this projected increase in numbers, a new paradigm in home care services has been developed over the last

few decades, namely restorative home care services. These services are designed to “create independence, improve self-image and self-esteem, and reduce the level of care required” through the delivery of a multi-dimensional individualized program.³ Most restorative home care services are 6–12 weeks in length, delivered by allied health care professionals or specially trained home care staff and comprise a number of components to assist in regaining independence. The majority of restorative home care services have an exercise program included, as it is widely accepted that exercise helps improve strength, mobility and balance, which is vital for regaining and retaining independence and function.^{4–6}



Most exercise programs included in restorative home care services are structured in nature, requiring the older person to complete a set of exercises, a number of times per day and/or a number of times per week. However, research has shown that some home care clients prefer to be active through daily activities such as housework, walking to the shops and doing the gardening.⁷ Lifestyle exercise programs promote this type of activity because their aim is to incorporate exercise into the person's daily routine and not require additional specific exercise time in one's day. The intervention period of the randomized controlled trial (RCT), of which the present study is the longer-term follow-up, found the lifestyle functional exercise program to be as effective, and on 40% of the outcome measures, more effective at program end than the structured exercise program in increasing older restorative clients' function.⁸ However, the aim of restorative home care services is to assist the person in regaining and then maintaining their independence over the longer term, not only during the intervention period, in order to avoid needing home care services. Both groups involved in the RCT received support from the allied health professional (care manager) delivering their service, who encouraged and monitored adherence to the exercise programs during the service period. This contact ceased on discharge and the service did not follow up whether the exercises were continued longer term. Many physical activity programs have shown improvement during the supervised intervention phase,⁹ only to have the exercise program discontinued by the person over the longer term.¹⁰ This could result in loss of any previous functional gains made. It is therefore important to determine whether either exercise program (lifestyle or structured) in the RCT was continued over the longer term without additional support and whether there were subsequent functional gains or losses.

The aim of this study was to compare the effectiveness and maintenance of the two exercise programs at six month follow-up. The two hypotheses to be tested were that the lifestyle exercise program would:

1. Be undertaken more often (preferred more) compared to the structured exercise program, and
2. Result in greater functional gains,

at six month follow-up.

Method

Study design. The study presented here is a parallel pragmatic RCT in which the effectiveness of a lifestyle functional exercise program, called LiFE (intervention group) was compared with the current structured exercise program (control group), at six month follow-up. The exercise programs were delivered as components of a restorative home care service. The effectiveness of LiFE was demonstrated in a rigorous trial published by Clemson et al in 2012.¹¹ In this current study, we used a modified LiFE program, reducing the amount of participant training and follow up from the original protocol.

Details of recruitment and the study protocol have been published elsewhere.¹²

Participants & setting. The study participants included persons living in metropolitan Perth (Western Australia) who were referred between August 2011 and April 2012 for a restorative home care service and met the inclusion criteria. These criteria were: over 65 years of age, assessed by their care manager as needing an exercise program, not having a diagnosis of dementia or other progressive neurological disorders, and able to communicate in English.

Data were collected in the participants' homes and the exercise programs were undertaken either at home or different places visited during the week, such as the footpath. No equipment was required for either program.

Study procedures. Eighty clients were randomly assigned to either the lifestyle exercise group or the structured exercise group. Originally a sample of 150 (75 in each group) was calculated based on the assumptions: hypothesis tests at the 0.05 level, 12% attrition rate (found in the pilot study),¹³ and an 80% power to detect "medium" effects (0.5 standard deviation)¹⁴ in the primary outcome (summary score). Recruitment was slower than expected and a number of strategies were tried, including increasing the recruitment period from five to eight months, visiting the care managers regularly and suggesting other strategies (eg, a sport scientist delivering the exercise programs). These were of no avail, because of organizational and staff changes that could not have been predicted and had an irreversible effect. At the end of the recruitment period, 80 clients had been recruited and participated in the six month RCT.

Randomization was conducted by a senior researcher not involved in the study. Cases were randomly allocated using the (simple) random number generator in STATA version 10. The researcher who collected follow-up data was not blinded to group allocation.

After giving consent to be involved in the study, participants completed baseline data collection. This included demographic, falls history over the last six months and home care service data. Functional data collected were: Functional Reach,¹⁵ Chair Sit to Stand,¹⁶ Timed Up and Go¹⁷ and the tandem walk.¹⁸ Other data included: the Falls Efficacy Scale,¹⁹ Activities-specific Balance Confidence scale,²⁰ Vitality Plus scale,²¹ and the Late Life Function and Disability instruments.^{22,23} Measurements were administered at baseline, eight weeks (end of the intervention) and six months (four months post intervention).

Once baseline data collection was complete, the care manager delivering either exercise program was notified of whether their client was allocated to the intervention or control group, and asked to begin that program during their next visit. Care managers gave either a LiFE manual or the structured exercise program sheet and a calendar to each client. The clients were asked to tick each day they did the exercises and to keep this until the completion of the study (six months).



Exercise programs.

Lifestyle and Functional Exercise (LiFE) program (intervention). The LiFE program was developed to improve balance and increase strength in older community-dwelling people by embedding exercise into everyday activities.¹¹ It was also developed as a falls prevention exercise program.²⁴ Seven of the activities in the program are designed to challenge balance and six are for improving lower limb strength. Clients randomized to LiFE had the program and different exercises explained to them before they and the care manager discussed and agreed how they could incorporate the exercises into their personal daily routines. The care manager also gave them a manual explaining each of the exercises. Follow-up visits were used to monitor how the client was managing the initial exercises and to encourage them to begin doing others. Clients were visited three times on average during their restorative home care service and LiFE was just one aspect of the service that was discussed during these visits. As stated, this training and support for the implementation of modified LiFE was much less than in the original research.^{24,25}

Current structured exercise program (control). The current structured exercise program was established to prevent falls and was originally based on the Otago exercise program developed by Campbell and Robertson.²⁶ The restorative home care team, who deliver the program, have modified the Otago program over time, in response to client preferences. It no longer includes weights and, depending on the client's requirements, sometimes additional exercises are included. Participants allocated to the current structured exercise program were given a sheet (back and front) illustrating the exercises and indicating the number of times per day and number of days per week to complete them. Exercises were explained to the participants and reviewed during follow-up visits.

Data analysis. All data were analyzed using SPSS version 19. The summary variable used as the primary outcome measure was created using clients' Functional Reach, Chair Sit to Stand, Timed Up and Go and tandem walk scores.¹² Repeated measures analysis of variance (ANOVA) was performed to compare the within-group changes over time of each of the two groups (LiFE and structured exercise). Post hoc testing using a Bonferroni adjustment was used to identify within-group changes over time and differences between the groups at baseline, post-testing (eight weeks) and follow-up (six months). Results are reported as means and standard deviations, *F* values and *p*-values. Analyses were performed according to intention-to-treat (ITT) principle. A *p* value of < 0.05 was taken to indicate a statistically significant association. Data analysis was supervised by a statistician not involved in the study.

Ethics approval. Prior to the commencement of the study, ethics approval was obtained from the Curtin University and Silver Chain Human Research Ethics committees. The RCT was registered with the Australian and New Zealand Clinical Trials Registry, ACTRN12611000788976.

Results

Figure 1 shows the participant flow for this RCT. A total of 1,993 clients were referred to a restorative home care service at Silver Chain between August 2011 and April 2012. Eighty clients randomized to the study were included in the ITT analysis. Baseline, end of the intervention post-testing and follow-up data were available for all participants who completed the study. However, there were two clients at baseline, five at post-intervention and eight clients at follow-up that were unable to complete the physical tests. This includes the seven clients that withdrew from the study during intervention and follow-up (see Fig. 1).

Baseline. The baseline demographics are summarized in Table 1. The average age of the LiFE clients was 80.2 years, compared to 79.6 years for the structured exercise group. More women (*n* = 66) than men (*n* = 14) were involved in the study and almost two-thirds of each group (LiFE: 60%; structured: 67.5%) lived alone. There were no significant differences found between the groups at baseline for any demographic, levels of dependency or outcome measures (see Table 2).

Restorative home care service population. During the recruitment period, 1993 clients received a restorative home care service from Silver Chain, the service provider. The demographics and dependency of the population were compared to the study clients. No significant differences were found between clients involved in the RCT and the general restorative home care population.⁸

Exercise adherence. Three quarters (*n* = 31) of the LiFE clients and 67.5% (*n* = 27) of the structured exercise group completed their daily calendars. LiFE clients undertook exercises on average 4.91 times per week during the intervention and 3.62 times per week during the four month follow-up period. Over the six months, they averaged 4.05 times per week. The structured exercise group exercised on average 4.42 times per week during the intervention period and 3.28 times per week during follow-up, giving an overall average of 3.66 times per week over six months. No significant difference was found between the groups for the number of times they exercised per week during the study.

Outcomes measured. The effects of the intervention on the functional outcome measures are outlined in Tables 2 and 3. A significant main effect of time was found for all measures. The majority of physical tests did not show a significant effect for the time x group interaction. This was also true for the summary score, which incorporated the balance, strength and mobility scores into one variable. The LiFE group did, however, show significantly greater improvement than the structured exercise group for the tandem walk ($F(2, 132) = 4.491, p = .024$) and the number of errors ($F(2, 132) = 4.045, p = .025$) when completing the tandem walk (see Table 2).

The LiFE group also showed significantly better progress over time for the ABC score ($F(2, 142) = 4.136, p = .026$) and the Vitality Plus scale ($F(2, 142) = 4.305, p = .016$) compared to the structured exercise group. Only one measure from the Late

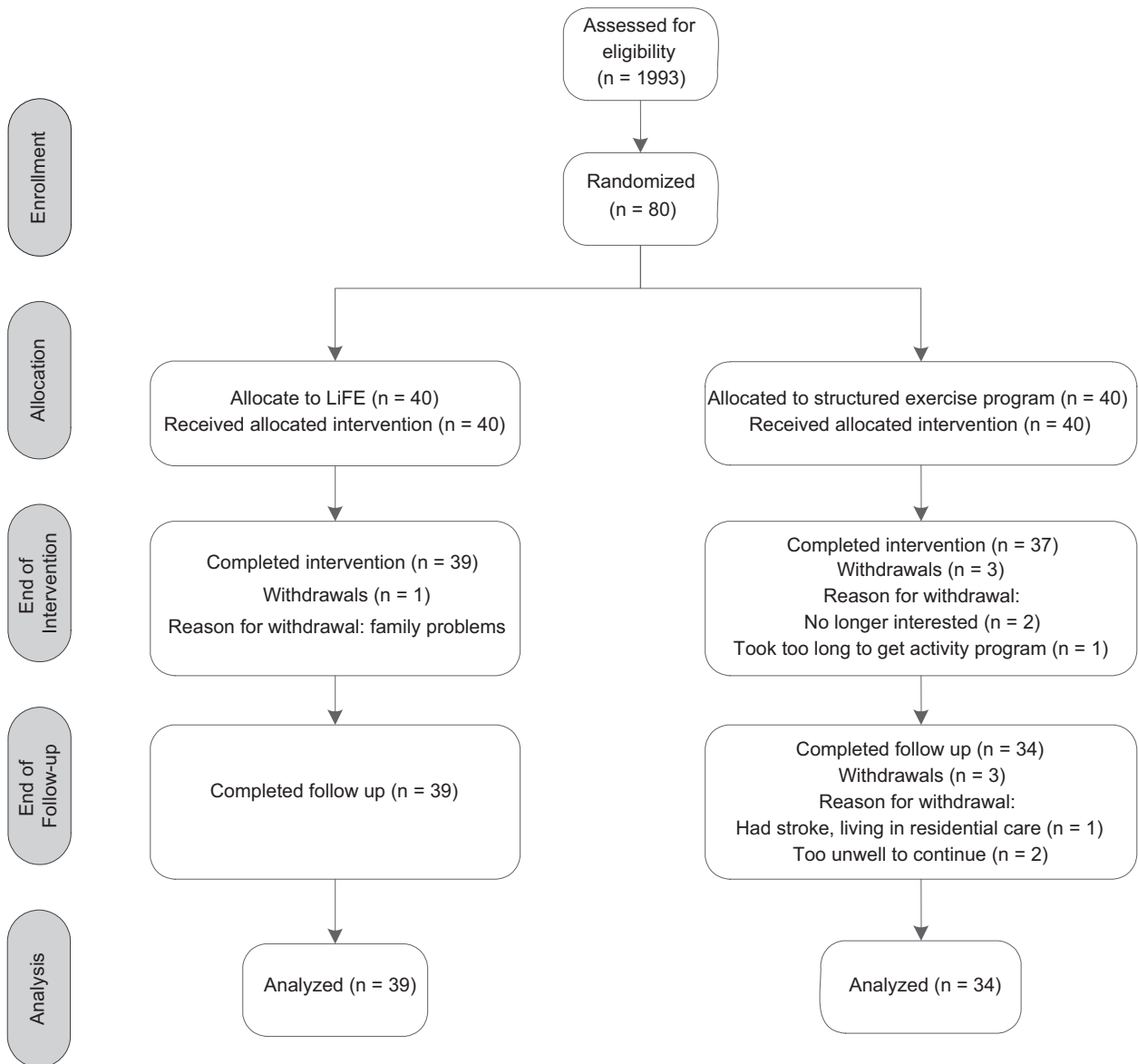


Figure 1. Participant flow through study.

Life Function and Disability instrument demonstrated a significant difference between the exercise groups over time; the LiFE group showed significantly greater improvement during the trial for basic lower extremity ($F(2, 142) = 6.680, p = .003$), which identifies lower limb ability (ie. strength and function). This measurement is based on tasks such as stair climbing, reaching overhead, standing from a low, soft couch and using a step stool.²²

Table 3 outlines the Bonferroni-adjusted pairwise comparisons for the five outcome measures that were significantly different between the groups. The LiFE group showed greater improvement in the tandem walk variables than the structured exercise group, particularly during the intervention period and between baseline and follow-up (see Fig. 2). Similar results were found for the Vitality Plus scale, with improvement by the LiFE group occurring during the intervention period and from baseline to follow-up. No significant improvement was evident

at any time point for the structured exercise group or from post-test to follow-up for the LiFE group. The ABC scale and the basic lower extremity measure showed significant improvement by both groups at the baseline to post-test and the baseline to follow-up time periods. Neither group improved enough between post-test and follow-up to show a significant change.

The number of health care services received at each data collection point was not significantly different between the exercise groups. There was also no difference in the number of falls each group had experienced in the six months before the study or during the six-month study period.

Discussion

This study was designed to compare the maintenance (exercise adherence) and effectiveness (functional gain) of a lifestyle exercise program and a structured exercise program when



Table 1. Demographics of the study.⁸

VARIABLES	LIFE (n = 40)	STRUCTURED (n = 40)	P-VALUE
Age (yrs)			.659
Mean (SD)	80.2 (6.4)	79.58 (6.2)	
Gender			.077
Female	30 (75%)	36 (90%)	
Male	10 (25%)	4 (10%)	
Country of birth			.145
Australia (%)	19 (47.5%)	27 (67.5%)	
England (%)	11 (27.5%)	5 (12.5%)	
Other (%)	10 (25%)	8 (20%)	
Language			.305
English Speaking (%)	37 (92.5%)	39 (97.5%)	
Non-English Speaking (%)	3 (7.5%)	1 (2.5%)	
Carer availability			.431
Has a Carer (%)	11 (27.5%)	8 (20%)	
Has no Carer (%)	29 (72.5%)	32 (80%)	
Living arrangements			.485
Lives Alone (%)	24 (60%)	27 (67.5%)	
Lives with Family/Others (%)	16 (40%)	13 (32.5%)	
Levels of dependency	(N = 37)	(N = 37)	.614
Low	6 (16.2%)	4 (10.8%)	
Medium	17 (45.9%)	21 (56.8%)	
High	14 (37.8%)	12 (32.4%)	

Table 2. Outcomes at baseline, post-test (8 weeks), and follow-up (6 months).

MEASUREMENT	LIFE (N = 40)	STRUCTURED (N = 40)	TIME F	GROUP F (BETWEEN EFFECT)	TIME x GROUP F
Exercise undertaken each week					
During intervention period	4.91 ± 2.04	4.42 ± 2.56			
End of intervention to end of follow-up	3.62 ± 2.51	3.28 ± 2.99	22.295***	.190	.002
Total exercise over 6 months	4.05 ± 2.19	3.66 ± 2.71			
Summary score					
Baseline	-.160 ± 1.02	-.014 ± .75			
Post-test	-.712 ± .78	-.311 ± .74	39.276***	2.455	2.183
Follow-up	-.783 ± .82	-.449 ± .60			
Functional reach					
Baseline	22.74 ± 6.29	21.63 ± 4.56			
Post-test	24.74 ± 7.10	23.20 ± 6.52	4.215*	1.414	.398
Follow-up	24.85 ± 7.59	22.57 ± 6.51			
Sit to stand 1					
Baseline	3.74 ± 1.70	3.97 ± 1.15			
Post-test	3.36 ± 2.01	3.37 ± .89	13.458***	.014	.760
Follow-up	3.22 ± 2.30	3.11 ± .92			
Sit to stand 5					
Baseline	17.73 ± 7.16	17.31 ± 4.85			
Post-test	15.68 ± 6.31	16.90 ± 4.79	7.564**	.106	1.334
Follow-up	15.35 ± 6.34	15.83 ± 4.49			
Timed up & go					
Baseline	13.77 ± 4.40	16.57 ± 6.75			
Post-test	12.29 ± 3.66	14.40 ± 4.53	12.359***	4.679*	.807
Follow-up	12.24 ± 4.35	13.88 ± 4.36			

(continued)



Table 2. (Continued)

MEASUREMENT	LIFE (N = 40)	STRUCTURED (N = 40)	TIME F	GROUP F (BETWEEN EFFECT)	TIME × GROUP F
Tandem walk					
Baseline	19.98 ± 14.20	17.49 ± 7.91			
Post-test	12.91 ± 6.18	15.91 ± 8.77	17.011***	.659	4.491*
Follow-up	10.67 ± 3.11	14.16 ± 6.01			
Tandem walk errors					
Baseline	8.47 ± 4.14	9.5 ± 4.07			
Post-test	4.42 ± 4.43	8.27 ± 4.35	20.894***	9.727**	4.045*
Follow-up	4.18 ± 4.89	7.47 ± 4.57			
Falls efficacy scale					
Baseline	28.87 ± 14.31	28.82 ± 15.15			
Post-test	17.38 ± 9.33	21.79 ± 13.93	33.449***	1.486	1.995
Follow-up	16.41 ± 7.96	21.29 ± 14.38			
ABC scale					
Baseline	56.37 ± 20.57	52.74 ± 21.72			
Post-test	77.52 ± 19.02	65.22 ± 23.73	67.444***	3.882	4.136*
Follow-up	75.66 ± 19.56	64.77 ± 21.06			
Vitality plus scale					
Baseline	31.05 ± 7.81	30.03 ± 7.46			
Post-test	35.42 ± 8.13	31.91 ± 7.30	19.425***	3.032	4.305*
Follow-up	36.08 ± 8.79	31.66 ± 7.48			
LLFDI total disability					
Baseline	48.94 ± 5.70	49.92 ± 5.03			
Post-test	50.24 ± 5.07	50.79 ± 5.31	16.395 ***	.260	.252
Follow-up	51.89 ± 6.35	52.23 ± 6.24			
LLFDI social role					
Baseline	43.20 ± 8.49	44.96 ± 7.11			
Post-test	44.44 ± 8.12	45.27 ± 7.94	3.907*	.275	.744
Follow-up	45.67 ± 9.40	45.94 ± 8.49			
LLFDI personal role					
Baseline	56.02 ± 9.51	56.71 ± 9.61			
Post-test	60.13 ± 11.78	60.36 ± 12.28	28.415***	.002	.132
Follow-up	66.10 ± 15.09	65.52 ± 13.64			
LLFDI limitation					
Baseline	60.02 ± 9.57	58.19 ± 10.61			
Post-test	74.18 ± 11.53	68.85 ± 14.13	89.354***	2.584	1.156
Follow-up	78.99 ± 14.75	73.66 ± 15.56			
LLFDI instrumental role					
Baseline	58.22 ± 12.66	54.74 ± 11.76			
Post-test	74.97 ± 14.00	66.73 ± 15.78	88.76***	3.767	1.217
Follow-up	78.97 ± 15.96	73.35 ± 17.70			
LLFDI management role					
Baseline	77.69 ± 14.57	82.21 ± 16.75			
Post-test	88.88 ± 11.32	88.06 ± 12.78	28.245***	.073	2.438
Follow-up	91.31 ± 11.70	89.80 ± 14.71			
LLFDI function total					
Baseline	49.37 ± 6.88	47.11 ± 5.46			
Post-test	56.88 ± 8.41	51.20 ± 6.43	49.605***	6.385	3.152
Follow-up	57.00 ± 8.21	52.22 ± 11.15			
LLFDI upper extremity					
Baseline	67.37 ± 15.41	65.90 ± 13.41			
Post-test	74.07 ± 13.38	71.38 ± 11.60	14.681***	1.414	1.180
Follow-up	76.09 ± 13.16	70.54 ± 12.89			
LLFDI basic lower extremity					
Baseline	59.07 ± 11.27	55.73 ± 9.43			
Post-test	71.14 ± 13.53	62.59 ± 12.76	55.245***	7.740**	6.680**
Follow-up	73.64 ± 16.37	62.34 ± 13.37			
LLFDI advanced lower extremity					
Baseline	30.68 ± 13.59	22.75 ± 15.25			
Post-test	42.90 ± 15.39	30.09 ± 15.10	27.581***	8.294**	1.498
Follow-up	40.42 ± 17.91	31.35 ± 20.52			

Notes: P < *.05, **.01, ***.001.

Abbreviation: LLFDI, late life function and disability instrument.

**Table 3.** Bonferroni adjusted pairwise comparison.

VARIABLES	BASELINE – POST TEST	BASELINE – FOLLOW-UP	POST TEST – FOLLOW-UP
	P VALUE	P VALUE	P VALUE
Tandem walk			
Time	.002**	<.001***	.013*
LiFE group	<.001***	<.001***	.046*
Current exercise group	1.00	.279	.269
Tandem walk errors			
Time	<.001***	<.001***	.681
LiFE group	<.001***	<.001***	1.00
Current exercise group	.388	.078	.638
ABC scale			
Time	<.001***	<.001***	.966
LiFE group	<.001***	<.001***	.729
Current exercise group	<.001***	<.001***	1.00
Vitality plus scale			
Time	<.001***	<.001***	1.00
LiFE group	<.001***	<.001***	1.00
Current exercise group	.068	.269	1.00
LLFDI basic lower extremity			
Time	<.001***	<.001***	.771
LiFE group	<.001***	<.001***	.199
Current exercise group	<.001***	.003**	1.00

Notes: p < .05*, p < .01**, p < .001***.

Abbreviation: LLFDI, late life function and disability instrument.

delivered as part of a restorative home care service. In terms of maintenance, no difference was found between groups in the frequency of exercising during follow-up. The LiFE group completed exercises marginally more frequently (4.05 times per week) than the older people with a history of falling who were involved in the Clemson et al¹¹ LiFE study (3.89 times per week). This was pleasing given our clients had fewer contacts with the care manager (number of visits = 3 over eight weeks) compared to those in the Clemson et al study (number of visits/calls = 9 over six months),¹¹ although Clemson et al's final score was taken at 12 months compared to six months for this study. Those in the structured exercise group maintained their exercises an average of 3.66 times per week over the six months, which was also a positive result given they were asked to complete them three times per day, every day, for the six-month study period. These results show that many restorative home care clients did maintain their exercises over the longer term, even after the service had ceased, and that both exercise programs have been shown to be appropriate and suitable for this population. However, the first hypothesis we tested, that the lifestyle exercise program would be undertaken more often and maintained over the duration of the study period more than the structured exercise program, did not receive any support.

The LiFE group showed significant improvement on a quarter of the outcome measures, whereas the structured exercise group did not show significant improvement on any measure. These results therefore support our second hypothesis that LiFE would result in greater functional gains than the structured exercise program during the maintenance period of the study. Improvement was seen in dynamic balance (tandem walk and errors made while completing tandem walk), increased confidence in completing challenging tasks without falling (ABC scale), improved health benefits from being active (Vitality Plus scale) and improved lower body function (Late Life Function instrument's basic lower body extremity measure) during the intervention period and from baseline to follow-up. Only the tandem walk showed significant improvement for the LiFE group between intervention post-testing and follow-up testing, compared to the structured exercise group.

The LiFE group was again found to show an improvement in the ABC score compared to the structured exercise group, as was the case during the intervention period study.⁸ The structured exercise group had a small decline in their ABC score between intervention and follow-up, subsequently maintaining a score below 67%, which according to LaJoie and Gallagher²⁷ means the older person may be at risk of falling or is predicted to fall in the future. The LiFE exercise group also

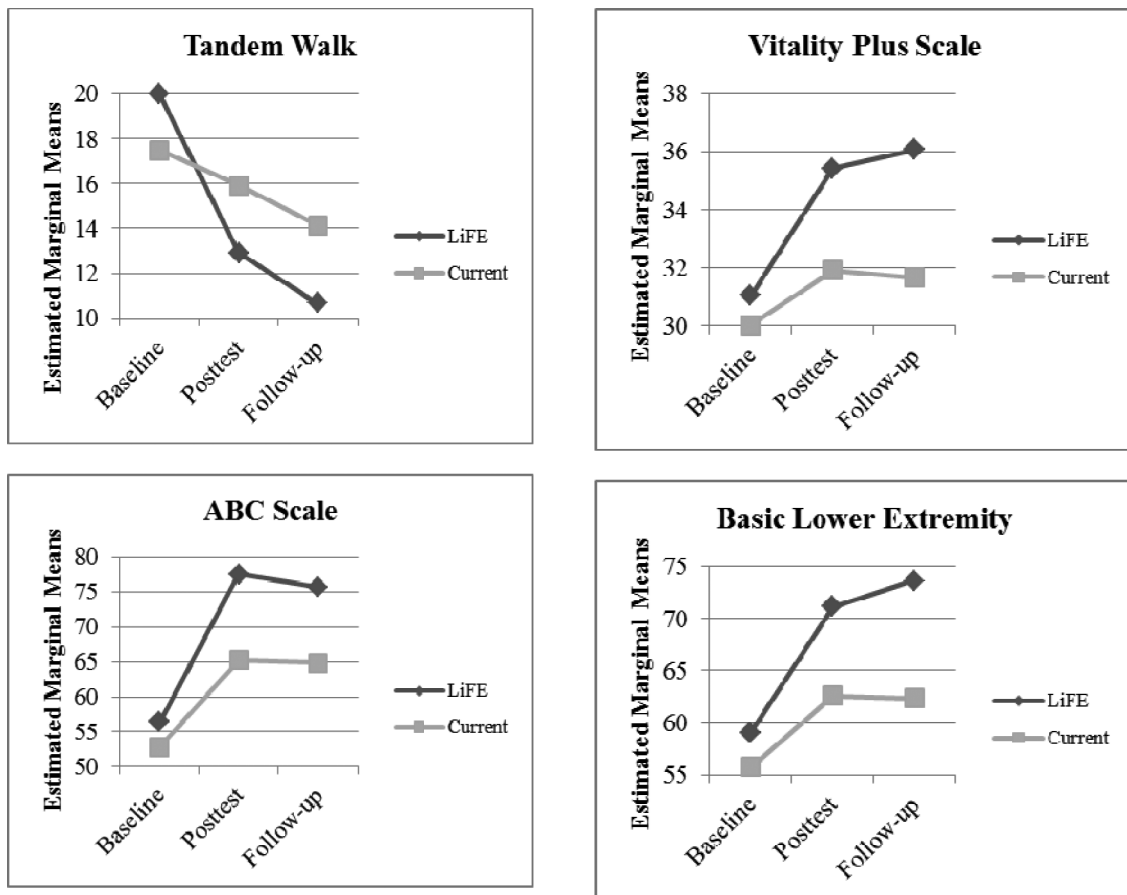


Figure 2. Changes in estimate means over time.

had a reduction in ABC score; however, they remained in the moderate level of physical functioning range.

Although the tandem walk was the only measure to show significant improvement during the maintenance phase (intervention post-testing to follow-up), 85% (17 out of 20) of the outcome measures for the LiFE group and 70% (14 out of 20) for the structured exercise group showed some improvement during this phase. Both exercise programs were therefore effective in assisting older people to maintain function for at least four months post intervention. However, given that the LiFE program showed better results over both the intervention and maintenance periods, it should be considered at the very least as an exercise program option within restorative home care services, if not as the exercise program of choice within that service. As the study sample was representative of the general restorative home care service population, there is support for the conclusion that the functional gains made by the LiFE study sample could be achieved by other restorative home care clients.

A methodological limitation within this study was the lack of blinding of the researcher collecting the follow-up data. An attempt was made to reduce the likelihood of observer bias by asking clients not to discuss their exercise program with the researcher during data collection visits. However, they often had their exercise manual or exercise sheet with them

and were keen to talk about how they were completing the exercises within their day.

The smaller than desired sample size may be considered a further limitation because it reduced the study's power to detect change in some outcome variables. The reduced sample size was a direct consequence of the lower than expected number of clients whose care plan included an exercise program by the care managers, and a number of organizational changes occurring during the recruitment period. Unfortunately, in undertaking a pragmatic RCT in a service that has been operating for a number of years, there is always the risk that organizational changes may occur during the recruitment and data collection periods that are beyond the control of the research team. This was the case, with the care managers being asked to work as mentors for staff of a new service; a turnover of staff (including maternity leave) with new staff taking longer to train and recruit clients; and the reduction in workload expected prior to the commencement of the RCT not occurring. A number of strategies were tried with the care managers, but unfortunately some found their involvement in the study too burdensome and therefore were unable to meet their recruitment targets. Although the sample size was smaller than originally calculated, the dropout rate was better than expected (8.75%, n = 7 compared to 12%, n = 15



expected), and in a number of instances the sample was still large enough for some differences between exercise programs to be found.

Conclusion

Our study is the first trial to examine the maintenance and effectiveness of a lifestyle exercise program compared to a structured exercise program being delivered to older people receiving a restorative home care service. The modified lifestyle exercise program, LiFE, was found to be significantly better on a quarter of the outcome measures even after service delivery had ceased. It is recommended that health and community care organizations delivering restorative home care services consider using LiFE as the exercise intervention, in particular with clients who are not interested in completing specific amounts of exercises each day or week, do not wish to use weights, or who suggest they have no time for exercise or being physically active.

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Author Contributions

Conceived and designed the experiments: EB, GL, LC. Analysed the data: EB. Wrote the first draft of the manuscript: EB. Contributed to the writing of the manuscript: EB, GL, LC, DB. Agree with manuscript results and conclusions: EB, GL, LC, DB. Jointly developed the structure and arguments for the paper: EB, GL. Made critical revisions and approved final version: EB, GL, LC, DB. All authors reviewed and approved of the final manuscript.

DISCLOSURES AND ETHICS

As a requirement of publication the authors have provided signed confirmation of their compliance with ethical and legal obligations including but not limited to compliance with ICMJE authorship and competing interests guidelines, that the article is neither under consideration for publication nor published elsewhere, of their compliance with legal and ethical guidelines concerning human and animal research participants (if applicable), and that permission has been obtained for reproduction of any copyrighted material. This article was subject to blind, independent, expert peer review. The reviewers reported no competing interests.

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