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Research

# Gym-based exercise and home-based exercise with telephone support have similar outcomes when used as maintenance programs in adults with chronic health conditions: a randomised trial

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KEY WORDS

Chronic disease
Exercise
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ABSTRACT

**Question**: What is the effectiveness of gym-based exercise versus home-based exercise with telephone follow-up amongst adults with chronic conditions who have completed a short-term exercise program supervised by a health professional? **Design**: A randomised, controlled trial with concealed allocation, intention-to-treat analysis, and blinded outcome assessment at baseline and 3, 6, 9 and 12 months. **Participants**: The participants were recruited following a 6-week exercise program at a community health service. **Intervention**: One group of participants received a gym-based exercise program for 12 months (gym group). The other group received a home-based exercise program for 12 months with telephone follow-up for the first 10 weeks (home group). **Outcome measures**: Outcome measures included European Quality of Life Instrument (EQ-5D), the Friendship Scale, the Hospital and Anxiety and Depression Scale, Phone-FITT, 6-minute walk test, body mass index and 15-second sit-to-stand test. **Results**: There was no significant difference between study groups in the primary outcome (EQ-5D visual analogue scale, 0 to 100) across the 12-month intervention period, with an estimate (adjusted regression coefficient) of the difference in effects of 0 (95% CI −5 to 4). The gym group demonstrated slightly fewer symptoms of depression over the 12-month period compared to the home group (mean difference 0.8 points on a 21-point scale, 95% CI 0.1 to 1.6). **Conclusion**: Similar long-term clinical outcomes and long-term exercise adherence are achieved with the two approaches examined in this study. Participation in gym-based group exercise may improve mental health outcomes slightly more, although the mechanisms for this are unclear because there was no change in the selected measure of social isolation or other measures of health and wellbeing. This finding may also be a Type 1 error. Further research to reproduce these results and that investigates the economic efficiency of these models of care is indicated. **Trial registration**: ACTRN12610001035011. **[Jansons P, Robins L, O'Brien L, Haines T (2017) Gym-based exercise and home-based exercise with telephone support have similar outcomes when used as maintenance programs in adults with chronic health conditions: a randomised trial. *Journal of Physiotherapy* XX: XX–XX]**



## Introduction

Australian Bureau of Statistics data from 2004 to 2005 demonstrate that approximately 70% of Australians aged > 15 years were classified as sedentary or having low levels of physical activity. Physical inactivity causes a significant public health burden, with direct healthcare costs estimated at over AUD377 million per year in Australia.[1] Chronic conditions such as coronary heart disease, stroke, depression, and type-II diabetes contribute the greatest burden to the Australian healthcare system.[2]

One of the easiest and most effective ways of reducing healthcare costs in Australia might be older adults having greater adherence to physical activity. There are a number of interventions to enhance physical activity in populations with chronic diseases such as cardiac disease, chronic obstructive pulmonary disease and diabetes. One such approach is to use short-term (4 to 6 weeks) supervised exercise programs. Supervised exercise programs in these populations have been shown to improve clinical health outcomes, such as quality of life, anxiety, depression and exercise tolerance.[3–5] However, there is evidence that exercise adherence declines after the programs are completed, with many people ceasing altogether. A randomised, controlled trial with 109 participants with chronic obstructive pulmonary disease identified that approximately 50% of older adults ceased exercise within 9 months of completing a supervised exercise program.[6] Unfortunately, the benefits of exercise are rapidly lost when exercise is ceased,[7] highlighting the need to promote ongoing participation. Hence, there is a need to identify ways of promoting ongoing physical activity following completion of a short-term supervised exercise program.

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Strategies to encourage ongoing participation frequently employ behaviour change techniques. Three main approaches have been used: home-based exercise programs with no follow-up,[8] gym-based exercise programs,[9–14] or home-based exercise programs with telephone follow-up.[6] Home-based prescribed physical activity programs with telephone support are thought to work by embedding exercise into daily routine, and avoiding the need for travel to an exercise centre. However, they may fail by not facilitating inter-personal connections between the individual and his/her peers, and by the prescriber having limited capacity to monitor the person's physical progress. Structured gym-based programs may have an advantage over home-based programs, by controlling the amount and quality of direct training and supervision, allowing personal attention and immediate verbal feedback from the exercise facilitator. Motivation for exercise may also be enhanced via social support and interaction between exercise group members with similar health issues.[15] However, there are conflicting findings across these studies as to which of these follow-up approaches is more effective, and none have yet undertaken a head-to-head comparison in a regional, suburban, single-site, community health centre.

The aim of this study was to compare the effectiveness of a home-based exercise program with telephone follow-up to a gym-based follow-up program amongst adults with a variety of chronic conditions and who had completed a short-term exercise program supervised by a health professional.

Therefore, the research question for this randomised, controlled trial was:

> What is the effectiveness of gym-based exercise versus home-based exercise with telephone follow-up amongst adults with chronic conditions who have completed a short-term exercise program supervised by a health professional?

## Method

### Design

This was a randomised, controlled trial with concealed allocation, and blinded outcome assessments conducted at baseline (ie, at the completion of the short-term supervised exercise program), 3, 6, 9 and 12 months. Prior to enrolment, all participants received an initial health assessment (also used to obtain participant baseline demographic data) from an exercise physiologist and then completed a 6-week supervised exercise program at a community health service. This consisted of 1-hour group exercise sessions, with participants encouraged to attend three sessions per week. Each participant was provided with a home-based exercise program at the conclusion of the supervised exercise program. Exercise physiologists collected baseline data for this trial at the discharge assessment of the short-term supervised program. Patients were then randomised to one of the two 12-month intervention programs. Randomisation involved the investigator opening a sealed, opaque envelope containing the random allocation sequence, which was developed by a separate investigator with no knowledge of participants' baseline results. This sequence was set out in permuted blocks of 4, 6 and 8, and was stratified by the participant's primary chronic disease diagnosis type (pulmonary, musculoskeletal, diabetes, other). A blinded research assistant conducted the reassessments at 3, 6, 9 and 12 months. Participants were not blinded to group allocation; therefore, their self-reported outcomes could not be considered to be blinded. However, the research assistants who administered the physical tests were blinded.

### Participants, therapists and centres

Participants were recruited from a pool of adults who had completed a 6-week exercise program at the Cardina Casey Community Health Service, South East Melbourne, Australia. Those referred to this service typically have: multiple co-morbidities; poor or declining mobility; physical de-conditioning; or a combination of these problems. Mixed population rehabilitation groups are a potentially useful mechanism of service delivery for regional areas where throughput within a specific diagnostic grouping is insufficient to justify a disease-specific rehabilitation program (eg, pulmonary rehabilitation). We excluded people with acute psychiatric impairment or cognitive impairment that made the person unsuitable for participation in a gym-based or home-based exercise program, as determined by health service staff. Partners and/or couples were also excluded from participation.

### Intervention

*Gym-based exercise program*

Participants allocated to the gym-based intervention were given a 12-month, individualised, exercise program. An exercise physiologist from the community health service supervised this at the gym from Monday to Friday for 2 hours per day. This meant that there was a person present at the gym with whom the participant already had a pre-established relationship from when they had completed the initial short-term supervised exercise program. Participants were encouraged to attend during the times that the exercise physiologist attended the gym. However, participants were able to independently attend the gym during off-peak times (Monday to Friday 08:00 to 16:00). Each participant was encouraged to complete a 1-hour exercise session, three times per week. They were required to pay the standard casual entry fee of AUD5 per visit to the gym. The exercise prescription adhered to the American College of Sports Medicine guidelines for chronic health conditions.[16]

The prescribed exercise included strengthening, aerobic and stretching exercise components. The strengthening component involved 40 minutes of six to eight strength training exercises for the upper and lower body (eg, leg press, calf raise, bicep curl, triceps push-down, lateral pull-down, chest press or scapula retraction) using pin-loaded resistance equipment, unless contra-indicated. Participants were prescribed a two-set repetition maximum per exercise set at a moderate intensity of approximately 60% of their 10-repetition maximum. The aerobic component of the exercise involved up to 15 minutes of stationary bike, treadmill or cross trainer. The rating of perceived exertion scale was used to monitor a safe 'moderate' intensity.[17] The stretching component involved 5 minutes of upper and lower limb stretching (eg, pectoral, shoulder, calf, hamstring and quadriceps) with two repetitions of each static stretch prescribed for 30 seconds. The healthcare professionals providing the intervention were trained in the Health Coaching Australia model that uses motivational interviewing techniques, solution-focused coaching and cognitive behavioural therapy techniques to identify techniques and address behavioural, emotional, situational and cognitive barriers to exercise adherence.[18]

*Home-based program with telephone support*

Participants allocated to the home-based intervention were also given a 12-month, individualised, exercise program. Each participant was encouraged to complete a 1-hour exercise session, three sessions per week, at home. The home-based exercise program was supervised via five telephone calls over the first 10 weeks, approximately 25 to 30 minutes in duration. The total time in minutes to complete the five phone calls for each participant was comparable to that spent supervising each participant in the gym over a 12-month intervention period. The exercise physiologist supervising the telephone intervention was also trained in the Health Coaching Australia Model. The same exercise physiologists who provided supervision for the gym-based program also provided the supervision for the home-based program, ensuring equivalence in the experience and educational background of the providers of each of these interventions.

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The exercise prescription aimed to be comparable to that of the gym-based program. It also adhered to the American College of Sports Medicine guidelines for chronic health conditions,[16] with strength, aerobic and stretching components comparable to the gym-based program. The strength-training component involved six to eight exercises for the upper and lower body (eg, sit to stand, calf raise, bicep curl, triceps push-down, lateral pull-down, chest press or scapula retraction) using body weight or an elastic exercise band[a] to provide resistance. The aerobic component included community walking or, if participants had access to their own exercise equipment such as a stationary bike, this was incorporated.

### Outcome measures

*Primary outcome*

Health-related quality of life was assessed using the European Quality of Life Instrument (EQ-5D).[19] This questionnaire contains five multiple-choice questions and a 100-point overall health state visual analogue scale. The five questions reflect mobility, personal care, usual activities, pain/discomfort and anxiety/depression. The respondent selects one of three ordinal statements to describe their health for each. In order to obtain an overall score, the Dolan utility calculator[20] was applied. A utility score is determined where 0 represents death and 1 perfect health. Test-retest reliability for community-based adults following stroke is 0.83 at 3 weeks and 0.86 at 3 months.[21] A minimum clinically important difference using this calculation approach for the EQ-5D amongst mixed chronic diagnosis groups has been estimated to be 0.074.[22]

*Secondary outcomes*

Productivity was measured using the Health and Labour Questionnaire.[23] This questionnaire contains methods for calculating productivity losses that are not the sole result of absenteeism.[23]

Social activity was measured using the Friendship Scale, which is a short and user-friendly instrument that measures six dimensions contributing to social isolation and social connection.[24] A score between 0 and 24 is obtained; higher scores indicate less social isolation.

Depression and anxiety were measured using the Hospital Anxiety and Depression Scale.[25] This scale includes 14 items, seven of which relate to an anxiety subscale and seven to a depression subscale. Each item is scored between 0 and 3, and a sub-scale score > 8 indicates a possible case and a score > 10 a probable case.[25]

Body mass index (BMI) was determined by body weight in kilograms divided by height in metres squared.[26] Body mass index has been shown to predict cardiac mortality across a 15-year span.[27]

The 15-second sit-to-stand test[28] was included, as it is commonly used to measure lower limb strength in older people. The test-retest reliability was established to be excellent (ICC = 0.96) in a study assessing older adults with knee or hip osteoarthritis.[29] In a study examining mobility tests for predicting multiple falls in community-dwelling older adults, good test-retest reliability was reported (ICC = 0.89).[30]

The 6-minute walk test,[31] which measures the distance a participant is able to walk in 6 minutes, was performed once per participant at each time point, using the American Thoracic Society guidelines. In community-dwelling adults aged ≥ 65 years, the 6-minute walk test showed correlations with the Short Physical Performance Battery (0.61), chair stand time (–0.62), habitual gait (0.80), maximal gait (0.80) and stair climb time (–0.83).[32]

Physical activity was measured using the Phone-FITT,[33] which is a self-reported questionnaire about the frequency, intensity, time and type of physical activity undertaken. The Phone-FITT allows respondents to report on household activity (such as cooking, cleaning and gardening), recreational physical activity (such as lifting weights or playing sport), and total physical activity. A total physical activity (PA) summary score between 0 and 209 can be derived from the frequency and duration data by multiplying the two across all questions and adding the products. A higher score signifies greater participation in physical activity.

Attendance at the community-based fitness centre over the 12 months was measured via gym scanning software that recorded client attendance. Participation in alternate forms of physical activity was measured at follow-up assessments at 3, 6, 9 and 12 months, with a patient-recorded logbook. Participation in the home-based exercise program was measured using the patient's logbook and collated at the 3, 6, 9 and 12-month assessments.

An adverse event was any injury or exacerbation of existing illness that required medical attention while participating in either intervention and was measured using the patient logbook at 3, 6, 9 and 12 months.

A range of other outcomes measures that were relevant to an economic evaluation of this trial were also collected, but will not be reported in this clinical trial report.

### Data analysis

Each of the outcomes was compared between groups using linear regression analyses. Data were clustered within individual participants and robust (Huber-White) variance estimates were used.[34] Each analysis compared groups across all follow-up assessments simultaneously with adjustment for baseline scores for that same outcome. A group-by-assessment time point interaction effect was also examined to see if there was a difference in the rate of change in an outcome between groups. Alpha criterion level was set at $p = 0.05$. All analyses were conducted using STATA software[b].

A sample size of 52 participants per group was required for this experiment to have 90% power to detect a 7-point change in the EQ-5D visual analogue scale of global health-related quality-of-life at the 12-month follow-up assessment. Many minimum clinically important difference levels have been established for the EQ-5D visual analogue scale across a range of patient populations with chronic disease, although a 7-point change is a standard that is commonly employed.[35] A standard deviation of 11 points was used on the basis of a pre-trial survey of 20 patients within the target group conducted by the investigators. A 10% participant attrition rate was accommodated for; thus we aimed to recruit 57 participants per group.

## Results

### Flow of participants, therapists and centres through the study

Participant movement through the study is illustrated in Figure 1.

### Characteristics of participants

A summary of the demographics of the participants is presented in Table 1 and the baseline scores on the outcome measures are presented in the first two columns of Table 2. The two groups were broadly similar at baseline, although some discrepancies in characteristics were evident in terms of the proportion of married participants; 42/54 (78%) in the gym group compared to 31/51 (61%) in the home group, and for the proportion who were widowed; 12/54 (24%) in the home group compared to 2/51 (4%) in the gym group. The gym group were more likely to be born in Australia (78 versus 60%), more likely to have a primary diagnosis of cancer (39 versus 23%) or diabetes (39 versus 23%) and less likely to have lung disease (24 versus 45%).

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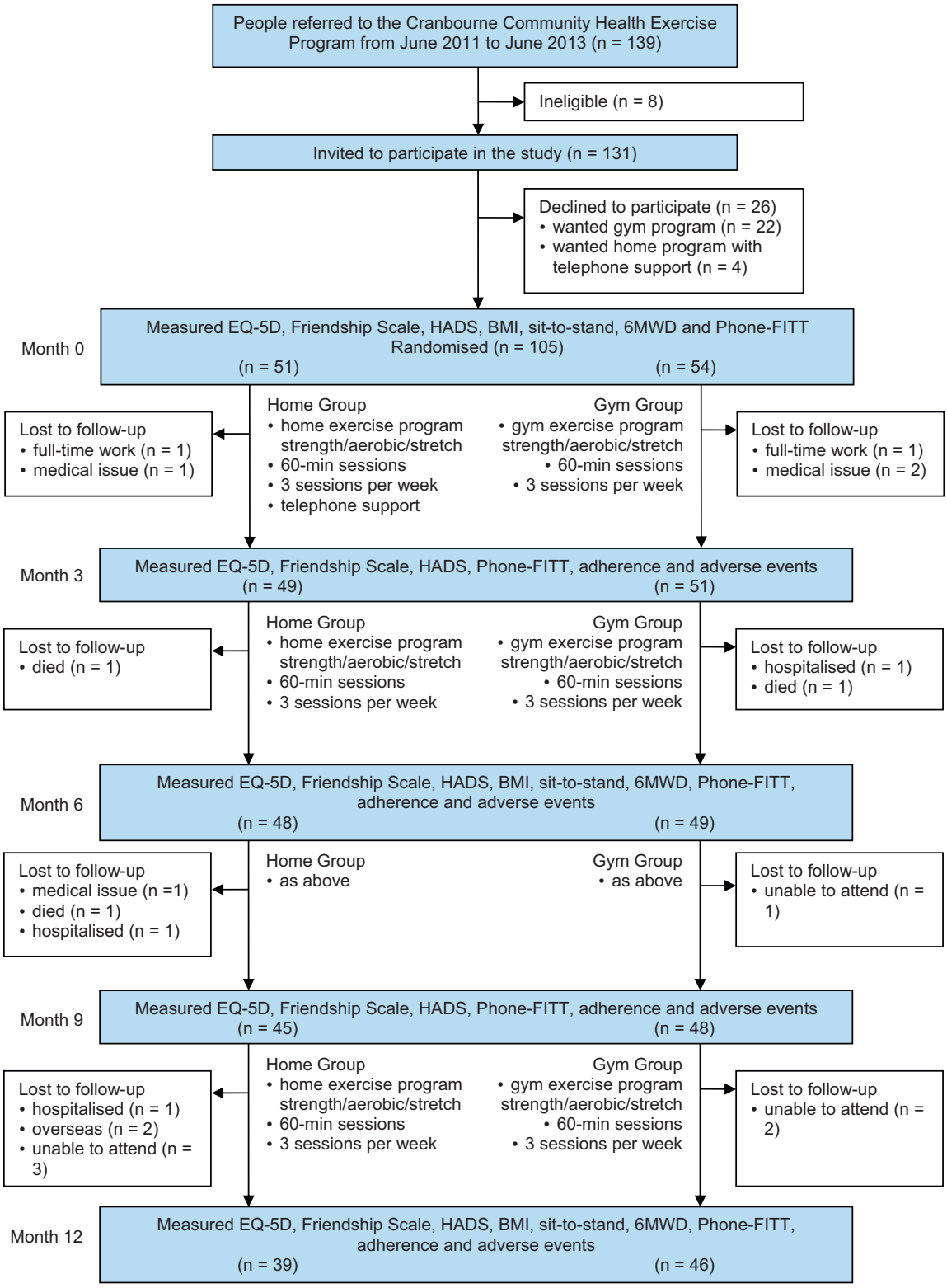


**Figure 1.** Design and flow of participants through the trial.

### *Effects of the interventions*

A summary of the primary and secondary outcome measures is presented in Table 2. (Individual participant data are presented in Table 3. See eAddenda for Table 3). The regression coefficients that are presented represent the between-group difference averaged across the follow-up time points adjusted for baseline scores. A second coefficient is also presented representing the group-by-time interaction effect to identify whether the effect of group allocation changed over follow-up time points. There was no significant difference between study groups in the EQ-5D (primary outcome) across the 12-month follow-up. The gym group demonstrated fewer symptoms of depression (Hospital Anxiety and Depression Scale - depression subscale) over the 12 months of follow-up compared to the home group ($p = 0.02$); however, this was the only significant between-group difference observed.

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**Table 1**
Baseline demographics and outcome measure scores for both groups.

| Characteristic | Home (n = 51) | Gym (n = 54) |
|---|---|---|
| Age *(yr)*, mean (sd) | 66 (13) | 68 (11) |
| Gender, n female (%) | 38 (75) | 29 (54) |
| Marital status, n (%) | | |
| married | 31 (61) | 42 (78) |
| widowed | 12 (24) | 2 (4) |
| divorced | 4 (8) | 7 (13) |
| separated | 3 (6) | 1 (2) |
| never married | 1 (2) | 2 (4) |
| Country of birth, n (%) | | |
| Australia | 31 (61) | 42 (78) |
| United Kingdom | 4 (8) | 3 (6) |
| other | 16 (31) | 9 (17) |
| Medical conditions, n (%) | | |
| congestive heart failure | 12 (24) | 12 (22) |
| other heart disease [a] | 45 (88) | 47 (87) |
| stroke [b] | 9 (18) | 12 (22) |
| cancer | 11 (22) | 6 (11) |
| osteoporosis or osteopenia | 2 (4) | 4 (7) |
| depression or anxiety | 20 (39) | 23 (43) |
| arthritis | 20 (39) | 21 (39) |
| diabetes | 12 (24) | 21 (39) |
| lung disease [c] | 23 (45) | 13 (24) |
| Parkinson's disease | 1 (2) | 0 (0) |
| inner ear dysfunction [d] | 2 (4) | 5 (9) |
| cataracts | 0 (0) | 0 (0) |
| other visual impairment | 11 (22) | 11 (20%) |
| broken bone since turning 60 | 11 (22) | 8 (15%) |
| joint replacement | 15 (29) | 18 (33) |
| Health service indicator, mean (SD) | | |
| hospitalised for $\geq$ 1night in past 3 mth | 0 (0) | 7.3 (9.3) |
| Health insurance status, n (%) | | |
| private health insurance | 11 (22) | 14 (26) |
| Department of Veterans' Affairs | 1 (2) | 3 (6) |

Gym = Gym-based exercise group, Home = Home-based exercise with telephone support group.
[a] Includes coronary heart disease, cardiomyopathy, ischaemic heart disease, hypertensive heart disease, inflammatory heart disease, disease affecting one or more valves of the heart, and heart murmur.
[b] Includes stroke, mini-strokes, aneurisms, and transient-ischaemic attacks.
[c] Includes asthma, emphysema, chronic obstructive pulmonary disease, and chronic obstructive airways disease.
[d] Affecting balance (eg, dizziness).

### *Adherence to the interventions*

The mean number of exercise sessions completed at the 12-month follow-up was 52 sessions (SD 43, range 0 to 156) in the home group compared to 53 sessions (SD 34, range 8 to 150) in the gym group. The proportion of people fully adherent (defined as three sessions completed per week) was 34% in the gym group and 33% in the home group.

### *Adverse events*

No participants in either group reported any adverse events after completing the allocated intervention.

## Discussion

This study has identified that gym-based and telephone follow-up approaches produce similar longer-term outcomes in people with chronic diseases who have recently undertaken a 6-week, centre-based, supervised exercise program. The only apparent difference in outcomes was identified for the Hospital Anxiety and Depression Scale (depression subscale) outcome. It had been anticipated that a gym-based program might produce superior mental health outcomes mediated via the social interaction that participants would have participated in while at the gym. However, no change was found in the measure of social isolation, bringing this hypothesis into question. It is possible that the measure of social isolation (the Friendship Scale) was not the correct scale to measure the change in the amount of social interaction a person encountered. The Lubben Social Network Scale[36] may have been preferable for this purpose, as it is a measure of social network size rather than one of loneliness and the ability to interact with others (as is the Friendship Scale). It is possible that a mechanism of action not mediated via social interaction may also have been responsible for this finding. For example, having to go to the gym forces people to leave their house, which has potential mental health benefits from experiencing new environments or being exposed to sunlight while travelling to the gym.[37,38] It is also possible that this may have been a Type 1 statistical error, given the number of secondary outcomes that were examined. Overall, the mechanism for the between-group difference in depression symptoms was unclear and warrants repeated investigation to reproduce this result and to more deeply examine the potential mechanism of action. It was encouraging, however, that the health states attained at the end of the initial program were largely maintained at 12 months in both groups.

To date, this study is the first to directly assess the effectiveness of gym-based follow-up compared with home-based follow-up via telephone support amongst people with chronic diseases who have just completed a supervised exercise program. A recent review identified 11 studies that have previously examined one of these interventions compared to a control. Meta-regression analyses found no differential effect of follow-up approach on the rates of adherence to the exercise programs that had been prescribed.[39] The present study concurred with this finding, in that it identified no difference in adherence rates between the two follow-up approaches. It is still possible, however, that the different approaches may have different therapeutic outcomes despite similar adherence rates. It could be postulated that exercising in a gym environment with a range of available equipment may enhance the ability of participants to exercise at a higher intensity. Further research would be required to see if this is the case.

A limitation of the present study was that it did not meet the planned sample size of 114 participants. This study was conducted in a somewhat regional suburban centre approximately 40 km from a major metropolitan city (Melbourne, Australia). The study location served as the single, major community health centre location for this area, meaning that many of the current and potentially future participants in this study often interacted with each other at this centre. Consequently, study recruiters noted that potential participants were becoming increasingly aware of the study prior to being approached as the study progressed. These 'study aware' individuals were forming preferences for study allocation grouping (usually centre-based), which then affected recruitment, in that people who did not prefer centre-based follow-up were disproportionately refusing to enter the study. A meeting of study investigators determined that it was better to cease the recruitment early at 105 rather than recruit a biased sample into the study. A consequence of this was that the study had lower statistical power than anticipated and that Type II statistical errors may have been made. A review of the analyses of the primary and secondary outcomes indicates that this may have been an issue for the Hospital Anxiety Depression Scale – Anxiety subscale.

The present study was not able to determine whether the exercise participation rates or health outcomes would have been any better for this patient population if a 'no follow-up' control condition been employed. Reis et al[12] and Berry et al[10] found that following the completion of a short-term, supervised, pulmonary exercise program, the initial gains in 6-minute walk test distance significantly declined with a 'no follow-up' control compared to a centre-based exercise intervention. The Short Form-36 quality of life questionnaire scores[12] and the Fitness Arthritis and Seniors Trial functional performance inventory[10] also significantly declined with a 'no follow-up' control. In contrast, the present 12-month follow-up indicated that health outcomes were largely unchanged over this period for people allocated to either of the two follow-up approaches. One could also question whether the adherence rates observed in this study were sufficient to generate

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**Table 2**
Mean (SD) of groups, adjusted regression coefficient (95% CI), and group-by-time interaction coefficient (95% CI).

| Outcome | Groups | | | | | | | | | | Adjusted[a] regression coefficient (95% CI) | Group-by-time interaction coefficient (95% CI) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month 0 | | Month 3 | | Month 6 | | Month 9 | | Month 12 | | | |
| | Home (n = 51) | Gym (n = 54) | Home (n = 49) | Gym (n = 51) | Home (n = 48) | Gym (n = 49) | Home (n = 45) | Gym (n = 48) | Home (n = 39) | Gym (n = 46) | Home minus Gym | Home minus Gym |
| EQ-5D, mean (SD) | | | | | | | | | | | | |
| VAS *(0 to 100)* | 70 (17) | 69 (15) | 64 (17)[c] | 67 (18) | 70 (15)[e] | 70 (14)[f] | 69 (18)[f] | 67 (17)[d] | 72 (17) | 68 (17) | 0 (−5 to 4) | 2 (0 to 4) |
| Utility *(−0.594 to 1.0)* | 0.67 (0.21) | 0.63 (0.26) | 0.65 (0.22)[c] | 0.59 (0.28) | 0.67 (0.25)[e] | 0.67 (0.25)[f] | 0.66 (0.22)[f] | 0.66 (0.23)[d] | 0.68 (0.22) | 0.67 (0.25) | −0.00 (−0.06 to 0.06) | −0.02 (−0.05 to 0.02) |
| Friendship Scale *(0 to 24)*, mean (SD) | 19.2 (3.9) | 19.2 (4.2) | 19.0 (4.4)[d] | 19.2 (4.5) | 19.8 (4.1)[e] | 19.7 (3.4)[f] | 19.1 (4.5)[f] | 20.0 (3.9)[f] | 17.1 (4.4)[c] | 17.5 (4.2) | −0.1 (−1.0 to 0.8) | 0.0 (−0.5 to 0.4) |
| HADS *(0 to 21)*, mean (SD) | | | | | | | | | | | | |
| Depression | 5.5 (2.9) | 5.3 (3.3) | 6.5 (3.6)[d] | 5.1 (3.4) | 5.5 (3.3)[e] | 4.8 (3.4)[f] | 5.6 (4.2)[f] | 4.5 (2.9)[f] | 5.7 (3.0) | 4.6 (3.2) | 0.8 (0.1 to 1.6) | −0.1 (−0.5 to 0.3) |
| Anxiety | 6.5 (3.9) | 5.8 (3.9) | 7.0 (3.9)[d] | 5.5 (4.2) | 4.6 (3.8)[g] | 5.8 (4.0)[f] | 6.6 (3.9)[f] | 4.6 (3.8)[f] | 7.1 (3.9) | 5.5 (4.4) | 0.8 (−0.1 to 1.8) | 0.1 (−0.3 to 0.5) |
| Body mass index *(kg/m²)*, mean (SD) | 30.7 (8.2) | 32.7 (8.6) | | | 31.0 (8.0)[h] | 32.8 (8.9)[i] | | | 31.2 (7.8)[j] | 32.5 (8.3)[f] | 0.3 (−0.3 to 0.9) | −0.1 (−0.5 to 0.3) |
| Sit-to-stand test, mean (SD) [b] | 4.5 (1.5) | 4.7 (1.3) | | | 5.0 (2.3)[h] | 5.3 (1.9)[i] | | | 5.3 (1.9)[j] | 5.1 (1.6)[d] | 0.0 (−0.5 to 0.5) | 0.2 (−0.1 to 0.6) |
| 6-minute walk test *(m)*, mean (SD) | 373 (101) | 378 (99) | | | 384 (107)[h] | 400 (97)[i] | | | 385 (127)[j] | 409 (84)[f] | −12 (−35 to 12) | −5 (−18 to 8) |
| Phone-FITT Sum Score, mean (SD) | 43 (15) | 48 (13) | 46 (15)[d] | 45 (14) | 49 (20)[e] | 50 (18)[d] | 46 (17)[e] | 46 (14)[d] | 47 (18)[c] | 48 (16)[c] | 2 (−2 to 6) | 0 (−3 to 2) |

EQ-5D = European Quality of Life Instrument, Gym = Gym-based exercise group, HADS = Hospital Anxiety & Depression Scale, Home = Home-based exercise with telephone support group.
Shaded row = primary outcome.
[a] Adjusted for baseline value.
[b] Number of sit-to-stands without hand support in 15 seconds, average of two tests.
[c] One missing data point.
[d] Two missing data points.
[e] Four missing data points.
[f] Three missing data points.
[g] Six missing data points.
[h] Fourteen missing data points.
[i] Five missing data points.
[j] Seven missing data points.

a physiological benefit for participants, as both groups only participated on average in one session per week. Previous research has identified that one session per week after previously completing a more intensive program is sufficient to maintain muscle strength, particularly when compared to completely stopping exercise participation.[40]

The present study had some other limitations. It was impossible to blind participants or people delivering the intervention as to group allocation. In the home-based group with telephone support, participants' self-reported adherence was recorded using logbooks, whereas in the gym-based group, attendance at the gym was recorded through electronic scanning of a membership card. It is anticipated that the self-report approach may be more prone to spuriously inflated scoring by study participants leading to an overestimate of exercise adherence rates in this group.

This research has implications both for clinical practice and future research. Clinicians could justifiably employ either of these follow-up approaches in clinical practice, although use of an approach that minimises overall healthcare resource use and aligns with patient preferences is recommended. As such, future research that investigates the cost-effectiveness of each follow-up approach should be considered. Furthermore, there is a need to compare these approaches in this patient population with a 'no follow-up' control to ensure that it is worthwhile pursuing either of these follow-up approaches. Future research could also take the form of a multicentre trial varying location (regional versus metropolitan) to investigate whether this factor influences the relative effectiveness and economic efficiency of either approach.

This study identified no difference in outcomes between the gym-based approach and the home-based approach with telephone follow-up for people with chronic diseases who had recently undertaken a 6-week, centre-based, supervised, exercise program. This was with the exception that gym-based follow-up may improve mental health outcomes. However, the mechanism for this was unclear, as there was no change in the selected measure of social isolation or other measures of health and wellbeing. Future research that investigates the cost-effectiveness of each follow-up approach should be considered.

**What is already known on this topic**: Supervised exercise programs in adults with a chronic disease improve clinical status. Unfortunately, many adults do not persist with the exercise after the supervised program, thereby losing the benefits they have obtained.
**What this study adds**: Adults with a chronic disease who have recently completed a supervised exercise program achieve similar outcomes and maintain similar exercise adherence a year later with either a gym-based maintenance exercise program or a home-based maintenance exercise program with telephone support. The gym-based program may improved mental health outcomes more, but this finding requires further investigation.

***Footnotes***: [a] Theraband™, The Hygenic Corporation, Akron, USA.
***eAddenda***: Table 3 can be found online at: http://dx.doi.org/10.1016/j.jphys.2017.05.018.
***Ethics approval***: The Southern Health Medical Research Ethics Committee; Number: 10187L approved this study. All participants gave written informed consent before data collection began.

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