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ORIGINAL ARTICLE

An Australian Football Themed Health Behaviour Change Intervention for Men With Cardiovascular Disease is Feasible and Acceptable: Results From a Feasibility Randomised Trial

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Background Physical activity (PA) and weight management are critical for cardiovascular disease (CVD) secondary prevention. However, PA adherence during or after cardiac rehabilitation is low. Here, we assess the feasibility and acceptability of the Australian football-themed *Aussie Fans in Training* (Aussie-FIT) program and associated trial procedures when adapted for men with CVD.

Method A pragmatic randomised control trial, with waitlist control arm, and follow-up measures at 3 and 6 months. Men with a CVD diagnosis and body mass index ≥25 kg/m^2 were recruited from community and clinical settings, and randomised, following baseline measures of health and health behaviours. The intervention arm attended 12 face-to-face football-themed education and PA sessions. Feasibility (recruitment, retention, attendance, and adherence to trial procedures) was assessed via mixed methods.

Results A total of 74% (64/86) of participants expressing interest met the eligibility criteria. Of those, 49 men (mean age=61.4, standard deviation=9.5, mean body mass index=31.3, standard deviation=4.2) were randomised. Program attendance rates (87% attended ≥80% of sessions) and retention (92%) were high. Trial retention at the primary end point (3 months) was high (86%) and at the 6-month follow-ups reduced to 67%. Program and trial procedures were acceptable, except for the request to visit a pathologist for the blood draw.

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Conclusions Using a football theme and setting may be a feasible way to engage men with CVD in health behaviour change. Given the existing pilot evidence for men at risk of CVD, and that recruitment rates were under the target, trialling a program for men with or at risk of CVD is recommended.

Keywords Cardiovascular disease • Physical activity • Weight management • Obesity • Feasibility

Introduction

The cardiovascular benefits of physical activity (PA) and a healthy diet are well established; however, PA adherence remains low in people with cardiovascular disease (CVD). Only 30% of eligible patients complete outpatient cardiac rehabilitation; of those, less than 50% are sufficiently active 12 months after their event [1]. Many lack self-management skills and are dependent on rehabilitation staff to sustain behaviour changes following hospital-based exercise programs [2]. An Australian study [3] estimated that increasing cardiac rehabilitation participation from 30% to 65% would accrue AUD $35.5 million in healthcare savings, AUD $58 million in social and economic benefits, and reduce heart attack hospital admissions by 2,100 per annum. To achieve this, new strategies, including gender-tailored programs, are required to increase adherence to PA and healthy eating in people with CVD. CVD is more common in men and men with CVD are less likely than women with CVD to take action for their health, and more likely to experience a subsequent cardiac event [4].

Recognition of the conflict between cultural constructions of masculinity and engagement in behaviours to improve health [5] has prompted the development of gender-tailored primary prevention programs for men, such as the internationally recognised 'Football Fans in Training' (FFIT) program [6] and our Australian adaptation, 'Aussie Fans in Training' (Aussie-FIT) [7]. FFIT and Aussie-FIT capitalise on men's interest in sport and passion for a favourite professional team to promote engagement in a program centred on weight loss via sustained improvements in diet and PA. These programs are effective in engaging men and may have the potential to promote positive health behaviours among men with CVD. A pilot randomised control trial (RCT) of Aussie-FIT involving 130 men (mean age=45.78, standard deviation [SD]=8.01) with overweight or obesity, at the two premier Australian Football League (AFL) clubs in Western Australia, was recently completed [8]. At 3 months, mean difference in weight between groups adjusted for baseline weight, was mean weight difference=3.33 kg (95% confidence interval 1.89–4.77) in favour of the intervention arm ($p<0.001$). Participating in the Aussie-FIT intervention significantly improved participants' PA levels, diet, sleep quality, psychological well-being, and perceived quality of health. Previous FFIT and Aussie-FIT studies have shown the value that men see in taking part in a program among other "men like me"—peers who are living with overweight and obesity and share a passion for and interest in football [9,10]. The use of the football club theme and facilities creates a novel 'hook' that has been shown to effectively engage men who may otherwise not engage in health behaviour change programs in less appealing settings such as hospitals or local gyms. The potential for these programs to engage different cohorts over time has also been demonstrated by the long-term sustainment of the Scottish FFIT program, which is now government-funded and routinely implemented as part of local health initiatives [11]. The appeal of this setting among men in Australia has also been evidenced. For example, in the pilot Aussie-FIT study focused on weight management, all 130 places were filled within 4 days of advertising at each club [10].

The feasibility, appeal, and effectiveness of 'Fans in Training' programs for men at risk of CVD because of their weight have been documented [11,12]. However, to date, these programs have focussed on weight management. This style of intervention has not been explored as a means to improve dietary and PA behaviours for secondary CVD prevention.

This study aimed to examine the feasibility and acceptability of the Aussie-FIT program among men with CVD to inform a larger effectiveness trial. Specifically, we assessed trial feasibility regarding participant uptake, adherence to the assessment protocol, and study retention. We also examined adherence to, and acceptability of, the Aussie-FIT program among participants with CVD.

Methods

Study Design

A feasibility study of a pragmatic RCT, with a waitlist control arm, and follow-up measures at 3 (post-program) and 6 months post-baseline. The trial was prospectively registered with the Australian New Zealand Clinical Trials Registry (ACTRN12620001260910), approved by the West Australian Health Department South Metropolitan Health Service Human Ethics Committee (RGS4254), and conducted between February to December 2021 in Perth, Western Australia. Conduct and reporting of this study align with the Consolidated Standards of Reporting Trials (CONSORT) extension to randomised pilot and feasibility studies [13].

Participants and Procedure

The target sample size (total n=72) was pragmatic, reflecting the feasibility aims. Eligible men were aged 18+ years with a body mass index (BMI) of $\geq$25 kg/m^2 and a CVD diagnosis $\geq$3 months prior to baseline (no upper limit). Participants were excluded if (a) they were unable to comprehend study

or consent information, (b) a medical professional advised against participation, or (c) they were waiting for or had undergone bariatric surgery within 12 months.

Recruitment methods included social media from the clubs' and Aussie-FIT accounts, radio advertising, leaflets distributed in the community and at cardiac rehabilitation classes, and identification from hospital records. Participants attended an enrolment appointment at the two participating Western AFL clubs in Perth, Western Australia, where informed consent was obtained. After baseline measurements were conducted by trained research assistants, participants were randomised (1:1) to the intervention or waitlist control arm by a blinded researcher using a computerised program. The 6-month follow-ups were undertaken when the control arm had completed the program.

The Intervention

Program content and delivery style were consistent with the original Aussie-FIT program [7]. Key features of the 12-week program of 90-minute sessions included practical activities and discussions to help participants understand why and how to improve diet behaviours (e.g., interpreting food labels, and portion sizes) and PA behaviours (e.g., understanding exercise intensities, safe strength training, and decreasing sedentary time), using behaviour change techniques. Program materials (e.g., participant workbook) were edited from the original Aussie-FIT program so that nutrition information and exercise intensities were appropriate for this population. Fitbits were distributed in the first week of the program and used throughout the program, as a self-monitoring device. Men attended the program in groups of 15. At the start of the 12-week program, the majority of the 90-minute session was education and discussion with less time (e.g., 20 minutes in weeks 1 and 2) dedicated to PA in the early weeks. As the program progressed and participants' confidence and fitness improved, the PA component increased in duration. PA activities promoted low to moderate intensity PA, with football activities like those undertaken in regular Australian football training but modified to be safe for each participant's limitations (e.g., ball skill drills restricted to walking, small-sided walking football games, and circuit training with a range of challenge level options). In addition to the football-themed PA component, the Australian football theme was further emphasised by the program delivery by club coaches within the football club facilities, with PA taking place in the club oval or gym, and education sessions being run in club spaces such as function rooms or player changing rooms. Participants also received a team T-shirt, and there was involvement of a club 'celebrity' in week 6. In this session, a former player discussed their experience of managing setbacks as a player and this was used as the basis for the participants to discuss potential setbacks in health behaviour change, and how they may overcome them. Coaches attended 2 days' training which, in addition to covering the core educational content (e.g., dietary and PA education, use of behaviour change techniques and motivational strategies), also included the development of strategies to promote 'team spirit' and bonding among the men, much as they may do with their other club teams. Coaches were encouraged to incorporate the football themes in other ways as well, such as telling football-themed stories, incorporating discussion and banter regarding the first team's current progress, and showing the participants 'behind the scenes' spaces not usually accessible to the public (e.g., player changing rooms). Coaches were encouraged to emphasise cooperation and to reduce competitiveness, for safety considerations, and also because focussing on outperforming others is motivationally maladaptive for long-term behavioural engagement [14]. Aligned with the original trial, coaches attended 2 days of interactive training in the program content, delivery methods, and the behaviour change, and motivation strategies employed in the program. Importantly, we trained coaches to utilise behaviour change techniques that target not only behaviour change initiation but also support behaviour maintenance [15]. Clubs provided access to facilities and use of sports equipment in-kind, and were compensated for the time coaches spent preparing and delivering the program.

Differences from the original Aussie-FIT program content included an increased focus on developing habits to self-monitor behaviours and feelings relevant to wellness to exercise (e.g., taking medications, bringing glyceryl trinitrate spray for angina management, and alertness to physical symptoms). Program materials were edited so that the nutrition information and recommended exercise intensities were relevant to this population. Coach training also included information on CVD and psychological responses to heart problems that the men may encounter. An Accredited Exercise Physiologist (AEP) attended the weekly sessions to support the coaches in managing any concerns the men may have regarding their wellness to exercise that day, and to respond in the event of an incident. The AEPs received training in identifying adverse responses to exercise and had current first aid and basic life support certifications. As the trial was undertaken during the COVID-19 pandemic, COVID-19 safety protocols were included.

Research has shown that exercise following an acute cardiac event is low risk, with an estimated sudden death or cardiac event rate during exercise in cardiac rehabilitation of 0.0001% [16]. Although the likelihood of an event during Aussie-FIT is low, such an event could be very serious, and we developed safety and risk management protocols. Prior to beginning the program, all men were reviewed by an AEP, who assessed the suitability of low, moderate, and vigorous PA. Participants' GPs and cardiologists were also notified of their enrolment in the program and asked to notify the study coordinator if they had any concerns about their involvement. The AEP who supported weekly sessions had skills to support the coach in adapting the physical activities to minimise risk and to respond to a medical situation. The safety protocol included ensuring the coach and AEP were familiar with the location of the automated external defibrillator and the emergency response protocol. Each week,

prior to engaging in the PA during the sessions, the coach and AEP went through a 'FIT to train?' review with the men, in which they were encouraged to personally reflect on whether they were 'Feeling well', were 'Injured/Ill', and whether they had 'Taken their medication with them that day or had with them what they needed'. Men were also encouraged to have their blood pressure checked by the AEP if relevant to them before starting the PA part of the sessions.

As the primary PA focus of the program is to promote engagement in PA outside of and beyond the 12-weekly sessions, we focussed on developing participants' confidence and skills to exercise safely and independently. Therefore, adaptations to the original program content also included an increased focus on developing habits to self-monitor behaviours, and self-assessment to ensure men participants were well and prepared for exercise (e.g., taken medications, brought glyceryl trinitrate spray for angina management, and alertness to physical symptoms awareness). Coach training also included content on CVD, safety considerations when working with this population, and potential psychological responses to heart problems. A consumer representative (i.e., man with CVD) reviewed and provided comments and feedback on the program resources, once adapted for men with CVD.

Measures

Participants completed a survey that included demographics and questions assessing their emotions, quality of life, self-esteem, sleep, and motivation to lose weight. Participants were requested to wear a hip-worn accelerometer for 8 days, and undertook one 24-hour dietary recall using Intake24 [17,18], a self-completed computerised dietary 24-hour recall system. As Intake24 has been validated with younger adults [17,18], we wanted to determine feasibility of use and data quality when used with an older population and in trial conditions. Blood pressure, weight, height, and waist measures were taken by the AEP or a trained researcher. A randomly selected sub-sample (up to 50% of participants) was asked to attend local pathology clinics to provide a fasted blood sample, for assessment of blood lipids. Table 1 [16–22] provides details of outcome assessments and timings. Participants were given an AUD$20 gift voucher to thank them for attending for measurements.

Intervention adherence was measured by program attendance. On completion of the program, participants completed a questionnaire addressing their perspectives on the feasibility and acceptability of the program and perceived helpfulness of content, adapted from our previous study [7]. Items were rated on a 1 (strongly disagree) to 7 (strongly agree) scale. Open response items invited participants to suggest strengths and improvements to the program.

Analysis

As a pilot and feasibility trial, the primary aim was to examine feasibility and acceptability of the intervention and study procedures to prepare for a fully powered trial, and not to assess intervention efficacy [23]. To inform a larger trial, we report descriptive statistics to help determine whether the intervention and trial procedures are feasible to deliver and considered acceptable among the target population. Participants' baseline characteristics are presented as number (percentage) and mean (SD). Accelerometer data were reduced to vertical axis movement counts of 60-s epoch. ActiLife version 6.5.4 software (Actigraph, Pensacola, FL, USA) was used to download the accelerometer data, and a validated algorithm was used to process 1-min epoch data in SAS version 9.3 (SAS Institute Inc., Cary, NC, USA). Established cutpoints [24,25] were used to classify each minute as sedentary (<100 counts per minute), light (100–1,951 counts per minute), moderate (1,952–5,724 counts per minute), or vigorous (>5,724 counts per minute) intensity. We calculated total steps per minute (i.e., uncensored step count). Participants with at least 4 valid days of accelerometer data, with a minimum of 10 hours of wear time per day were included in analysis. Dietary intakes were analysed for percentage energy from macronutrients, alcohol, fibre and sodium using the AUSNUT 2011–2013 database [19] and the acceptable macronutrient distribution ranges (AMDRs) for macronutrients to reduce chronic disease risk [26]. Dietary recalls with implausible reported energy intakes (determined *a priori* as <3,360 kJ/day or >17,640 kJ/day [27]) were excluded. Participants' physical health, well-being, and health behaviours at each time point, are described and the number completing each outcome measure is reported.

Deviations From Protocol

Soon after recruitment opened, BMI criteria were lowered from ≥28 to ≥25 kg/m^2. This decision was made, following discussion within the research team, because two of the first five men to express interest were ineligible only on account of the BMI criteria, and it was considered inappropriate to exclude men who expressed interest and were overweight (i.e., BMI 25–30) and hence could benefit from the program. Serum C-reactive protein analysis was erroneously omitted by the laboratory and is not reported. Multilevel models were not tested due to the sample size.

Results

Recruitment

Of 86 men expressing interest in the program, 64 were eligible. Men were excluded for reasons including no CVD diagnosis (n=11), recent cardiac event (<3 months, n=2), participating in weight loss program (n=2), medical professional advised against participation (n=1), and could not commit to the 12-week program (n=6). Of the 64 men, 49 agreed to attend the baseline measures and were willing to be randomised (77%). In total, 10% of participants heard about the program via club newsletters, websites, and social media, 24% heard an advert on the radio, 22% were recruited from cardiac rehabilitation classes delivered in the

Table 1 Summary of measures at each time point.

	Measurement details	Baseline	3-mo	6-mo
Objective measures				
PA, sedentary time	ActiGraph GTX-9 (ActiGraph, Pensacola, FL, USA) worn on waist continuously (24 h/day) for the next 9 days, except when in water (e.g., bathing). Devices were set up to gather continuous data at 30Hz (processed in 60sec epoch)	X	X	X
Weight	Weight (kilograms) measured with valid, reliable body scale (e.g., Tanita); light clothing, no shoes, empty pockets; blinded assessor	X	X	X
Height	Height (centimetres) using a stadiometer (e.g., Seca); without shoes	X		
BMI	Weight divided by height squared (kg/m^2)	X	X	X
Waist circumference	Measured twice using tape measure (three times, if first two measurements differ by ≥5 mm) and mean of all recorded measurements calculated. Measured at midpoint between last rib and iliac crest	X	X	X
Resting systolic and diastolic blood pressure	Digital blood pressure monitor (Omron HBP-1320, Milton Keynes, UK) monitor after 5 min sitting. If systolic blood pressure is ≥150 mmHg and/or measured diastolic blood pressure ≥95 mmHg, two further measures taken	X	X	X
Biological markers of CVD risk[a]	Specimens taken at community pathology clinics. Fasted Blood lipid profile, Alkaline phosphatase; Alanine aminotransferase; Total Bilirubin; Total Cholesterol; Creatinine plasma; Estimated Glomerular filtration rate; Gamma glutamyltransferase; High-Density Lipoprotein; Haemoglobin A1c (IFCC); Low-Density Lipoprotein; Sodium; Haemoglobin A1c (NGSP) %; Non-High-Density Lipoprotein cholesterol; Potassium; Total Protein; Albumin; Triglycerides; Urea; Globulins (TP-ALB)	X	X	X
Self-reported measures				
Demographics	Age, ethnicity, education, marital status, employment status, income, housing status	X		

Table 1. (continued).

	Measurement details	Baseline	3-mo	6-mo
Food intake [17,18]	Intake24-open-source, online, self-completed computerised dietary recall system based on multiple-pass 24-hour recall. Completed with assistance of trained interviewer or in own time. Nutrient intakes determined using AUSNUT 2011-13 food composition database [19]	X	X	X
Positive and negative affect [16]	Short Form of positive and negative affect scale	X	X	X
Self-esteem [20]	Rosenberg Self-Esteem scale	X	X	X
Quality of life [21]	Health-related quality of life, EQ-5D-5 L	X	X	X
Sleep [19]	Pittsburgh Sleep Questionnaire	X	X	X
Motivation [22]	Motivation to change health behaviours	X	X	X
Self-reported program evaluation measures				
Recruitment	How participants found out about program; program uptake (number people who: expressed interest; met inclusion criteria)	X		
Program evaluation	Acceptability questionnaire adapted from original Aussie-FIT program Completed T2 for first cohort and T3 for second cohort		X	X

[a]Subsample of participants only.

Abbreviations: PA, physical activity; X, timepoint at which the measurement was taken; BMI, body mass index; CVD, cardiovascular disease; IFFC, International Federation of Clinical Chemistry and Laboratory Medicine; NGSP, National Glycohemoglobin Standardization Program; TP-ALB, total protein and albumin/globulin.

hospital (8%) or community (14%). Thirteen (13) participants did not indicate where they originally heard about the program. Figure 1 presents participant flow through the trial.

Trial Adherence

Attendance at follow-up measures

Across the whole sample, 88% (n=43) and 78% (n=35) of participants attended the first and second follow-ups, respectively. There was negligible between-group difference in rates between the intervention arm attendance at first (88%, n=22) and second (64%, n=16) follow-ups, and the control arm attendance at first (88%, n=21) and second follow-ups (79%, n=19).

Adherence to accelerometer wear protocol

All participants issued an accelerometer at baseline were willing to wear the device. At baseline, 47 of 49 participants (96%) complied with the wear protocol sufficiently for their data to be included in analysis. At first follow-up, 39 participants were issued the device, with 97% (n=38) reaching the threshold of ≥4 days valid wear time. Equivalent figures at the second (6 months) follow-up, were 32 participants and 97% (n=31) valid wear time.

Pathology samples

Of the 50% (n=25) of randomly selected participants invited to attend a pathology clinic to provide a fasted blood sample, only 18 did so at any one of the time points (n=16 at baseline, n=13 at first follow-up and n=9 at final follow-up). Numbers providing samples at three, two and one time points were n=7, n=4 and n-6 respectively.

Characteristics of Recruited Sample

Demographics

Participants were typically aged 61 years (SD=9.63, range=30–77 years). Most (27/49) were in paid employment (55%); 33% (16/49) were retired. A total of 29% (14/49) had a university degree. Most (82%) were married or cohabiting (40/49). Participants had received a CVD diagnosis on average 8 years previously (SD=10.73). Demographic characteristics are presented in Supplementary Table 1.

Health and health behaviours

Descriptive statistics for health and health behaviour indicators between groups at each time point are presented in Tables 2–4 and Supplementary Table 2. At baseline, participants were typically living with overweight or obesity (mean weight=93.45 kg, SD=14.48; mean BMI=31.29, SD=4.23), and

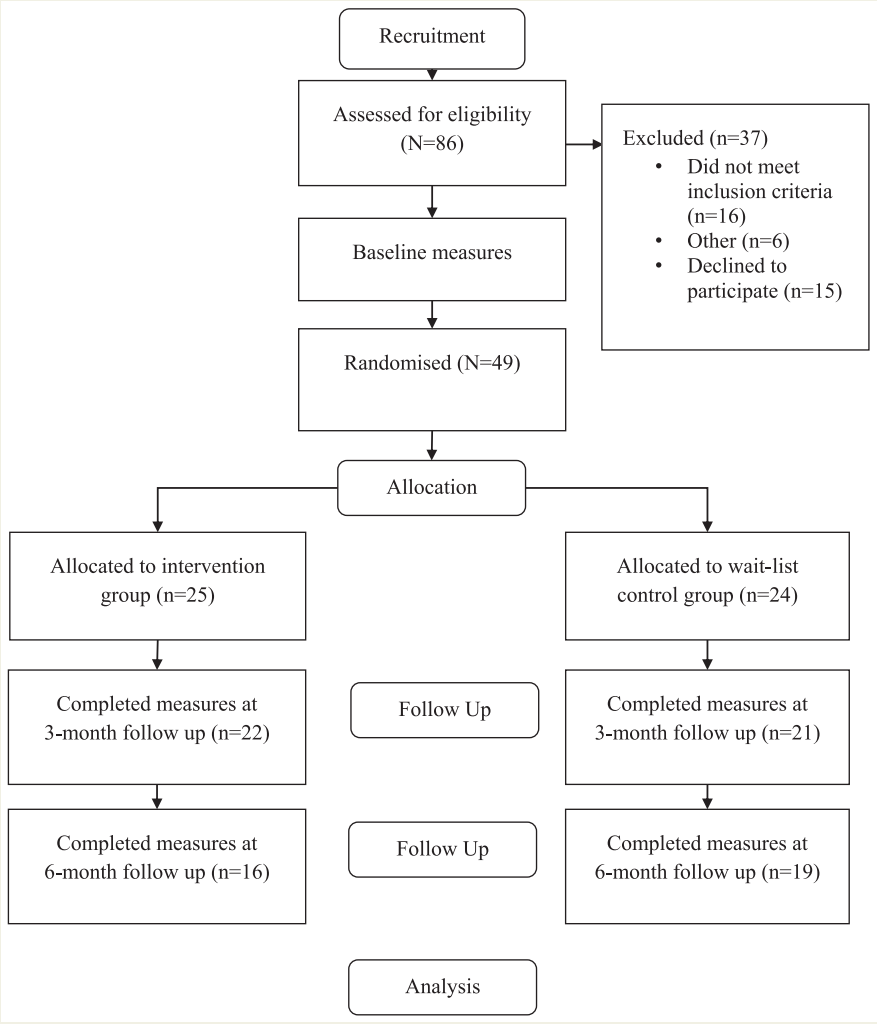

Figure 1 CONSORT Flow Diagram.
Abbreviation: CONSORT, Consolidated Standards of Reporting Trials.

had raised blood pressure (mean systolic=141.10, SD=14.12; mean diastolic=88.78 SD=8.73). Mean waist circumference (mean=111.44 cm, SD=11.06) was >94 cm, indicative of central adiposity. On average, participants engaged in 33 minutes of daily moderate or vigorous PA (mean time=33.01 minutes, SD=22.97); were sedentary for over 9 hours a day (mean time=553.68 minutes); and accumulated 31.40 minutes of moderate activity and 1.61 minutes of vigorous activity (mean time in moderate and vigorous physical activity [MVPA]=33.01 minutes; SD=22.97). Following the removal of implausible dietary intakes, over two-thirds of participants reported diet at baseline (n=33/49), T1 (n=32/46) and T2 (n=28/36). Across all time points, reported energy intake was low relative to estimated energy requirements for men of this age and weight (approximately 10,000–12,000 kJ/d). For the majority, protein and fat intakes were within the AMDR, whereas sodium intakes were above, and carbohydrate and fibre intakes were below the AMDR. Time taken to complete the Intake24 was 18 minutes at baseline, 16 minutes at T1 and 14.5 minutes at T2. Among participants (n=16) who provided a blood sample at baseline, serum alanine aminotransferase level was elevated in the intervention group only. Low-density lipoprotein level was elevated in the intervention group at 6-month follow-up and serum triglycerides were elevated in the control group at baseline and 3-month follow-up. All other biomarkers were within the normal range for both groups at each time point (Table 4).

Program adherence

Twenty-three (23) of the 25 participants (92%) in the intervention arm started the program following attendance at the baseline measures session. Four (4) participants in the wait-list control group dropped out post-baseline, and did not start the program. Across deliveries to the intervention and control arms, program attendance rates were good; on average participants attended 77% of the 12 sessions. In total, 37 participants (76%) completed at least six sessions. We considered a program dropout to be any man who had either

Table 2 **Device-measured PA and sedentary time, by timepoint and condition.**

Wear-time, PA and sedentary time	Baseline[a]		3-mo follow up[b]		6-mo follow up[c]	
	Intervention (n=23)	Control (n=24)	Intervention (n=20)	Control (n=18)	Intervention (n=15)	Control (n=17)
Number of valid days (≥ chosen amount, 10+ hrs waking wear time)	7.74 (1.89)	7.96 (1.92)	6.70 (1.38)	6.83 (1.47)	6.73 (1.10)	6.76 (1.44)
Waking wear time per day (mean of daily totals on valid days, mins/day)	851.78 (80.90)	889.81 (117.17)	874.75 (110.47)	859.98 (85.21)	864.24 (59.29)	883.60 (106.09)
Sedentary time per day (<chosen cutpoint [100 cpm]), mean of daily totals on valid days, mins/day)	554.11 (84.52)	553.26 (108.53)	550.98 (119.59)	522.83 (89.42)	530.35 (73.28)	566.66 (79.10)
Light activity time per day (100 to <1,952 cpm, chosen cutpoints), mean of daily totals on valid days, mins/day)	262.30 (65.50)	305.81 (79.71)	287.23 (87.47)	311.09 (78.42)	295.49 (70.74)	285.24 (76.75)
Moderate activity time per day (1,952 to <5,275 cpm, chosen cutpoints), mean of daily totals on valid days, mins/day)	33.38 (22.00)	29.50 (22.15)	34.09 (24.56)	25.15 (15.59)	36.63 (32.97)	28.41 (22.72)
Vigorous activity time per day (≥5,275 cpm, chosen cutpoint), mean of daily totals on valid days, mins/day)	1.99 (6.00)	1.24 (3.89)	2.45 (7.79)	0.92 (2.28)	1.78 (3.92)	3.29 (12.14)
Moderate-vigorous activity time per day (≥1,952 cpm, chosen cutpoints), mean of daily totals on valid days, mins/day)	35.37 (23.12)	30.74 (23.09)	36.53 (26.88)	26.07 (16.12)	38.41 (33.61)	31.70 (30.22)
Accelerometer steps per day, mean of daily totals on valid days, steps/day)	13,219.44 (3,980.36)	14,190.25 (3,773.34)	14,405.54 (4,708.27)	14,634.46 (3,878.41)	14,458.39 (4,334.84)	13,991.89 (4,933.02)
Accelerometer filtered steps per day (steps when counts are ≥100 cpm), mean of daily totals on valid days, steps/day)	11,103.77 (3,787.75)	11,982.89 (3,597.68)	12,221.98 (4,443.61)	12,178.60 (3,448.74)	12,334.80 (4,240.10)	11,764.54 (4,528.62)

[a]Two (2) cases were excluded due to <4 valid days.

[b]Data reported at 3 months reflects outcomes immediately post-intervention for the intervention arm, and before they start the intervention for the control arm. One (1) case excluded due to <4 days.

[c]Data reported at 6 months reflects outcomes immediately post-intervention for the waitlist control arm, and 3 months post-intervention for the intervention arm. One (1) case excluded due to <4 days.

Abbreviations: PA, physical activity; MVPA, moderate and vigorous physical activity; cpm, counts per minute.

Table 3 Dietary intake at each time point, by condition.

Dietary intake	Intervention n=16 (95% CI)		Control n=17 (95% CI)	
Daily total for energy, with dietary fibre (kJ)				
Baseline	7,336	(5,830–9,909)	6,935	(6,201–11,124)
T1	6,713	(5,821–8,298)	7,297	(5,650–9,449)
T2	7,567	(5,179–8,672)	6,664	(5,823–7,987)
% Energy from protein				
Baseline	17.72	(16.93–20.89)	16.26	(14.75–21.04)
<AMDR	2	12.5%	5	29.4%
Meeting AMDR 15%–25% of TEI	13	81.3%	10	58.8%
Above AMDR	1	6.3%	2	11.8%
T1	19.40	(14.92–23.66)	17.76	(14.03–19.46)
<AMDR	4	26.7%	6	35.3%
Meeting AMDR 15%–25% of TEI	8	53.3%	11	64.7%
Above AMDR	3	20.0%	0	0.0%
T2	17.72	(15.53–19.01)	16.71	(14.96–19.94)
<AMDR	2	16.7%	4	26.7%
Meeting AMDR 15%–25% of TEI	10	83.3%	9	60.0%
Above AMDR	0	0.0%	2	13.3%
%Energy from fat				
Baseline	33.75	(29.96–36.93)	33.99	(31.72–36.61)
<AMDR	0	0.0%	0	0.0%
Meeting AMDR 20%–35% of TEI	10	62.5%	9	52.9%
Above AMDR	6	37.5%	8	47.1%
T1	32.70	(29.38–37.81)	37.13	(30.67–39.72)
<AMDR	0	0.0%	0	0.0%
Meeting AMDR 20%–35% of TEI	9	60.0%	8	47.1%
Above AMDR	6	40.0%	9	52.9%
T2	36.04	(27.32–42.4)	36.03	(31.91–43.71)
<AMDR	1	8.3%	1	6.3%
Meeting AMDR 20%–35% of TEI	5	41.7%	6	37.5%
Above AMDR	6	50.0%	9	56.3%
% Energy from carbohydrates				
Baseline	42.82	(37.29–45.64)	46.28	(36.65–49.91)
<AMDR	10	62.5%	7	41.2%
Meeting AMDR 45%–65% of TEI	6	37.5%	10	58.8%
Above AMDR	0	0.0%	0	0.0%
T1	41.25	(34–45.41)	44.63	(36.94–48.13)
<AMDR	10	66.7%	9	52.9%
Meeting AMDR 45%–65% of TEI	5	33.3%	7	41.2%
Above AMDR	0	0.0%	1	5.9%
T2	38.97	(32.88–50.72)	39.17	(35.71–45.48)
<AMDR	8	66.7%	12	75.0%
Meeting AMDR 45%–65% of TEI	3	25.0%	4	25.0%
Above AMDR	1	8.3%	0	0.0%
% Energy from alcohol				
Baseline	0.00	(0–8.21)	0.00	(0–0.23)
T1	0.00	(0–8.66)	0.00	(0–0)
T2	0.00	(0–4.18)	0.00	(0–0.07)
Daily total for dietary fibre (g)				
Baseline	23.79	(17.58–30.77)	20.90	(16.04–30.54)
< SDT of 38 g fibre (men)	13	81.3%	15	88.2%
≥ SDT of 38 g fibre (men)	3	18.8%	2	11.8%

Table 3. (continued).

Dietary intake	Intervention n=16 (95% CI)		Control n=17 (95% CI)	
T1	17.89	(15.76–24.45)	18.32	(15.08–27.04)
< SDT of 38 g fibre (men)	14	93.3%	17	100.0%
≥ SDT of 38 g fibre (men)	1	6.7%	0	0.0%
T2	22.47	(12.27–24.56)	18.66	(13.24–23.93)
< SDT of 38 g fibre (men)	12	100.0%	16	100.0%
≥ SDT of 38 g fibre (men)	0	0.0%	0	0.0%
Daily total for sodium (Na) (mg)				
Baseline	2,060	(1,355–3,307)	2,232	(1,316–2,929)
< SDT of 2,000 mg sodium (men)	7	43.8%	6	35.3%
≥ SDT of 2,000 mg sodium (men)	9	56.3%	11	64.7%
T1	1,948	(1,588–2,353)	1,995	(1,541–2,979)
< SDT of 2,000 mg sodium (men)	8	53.3%	9	52.9%
≥ SDT of 2,000 mg sodium (men)	7	46.7%	8	47.1%
T2	2,045		1,824	(1,452–2,821)
< SDT of 2,000 mg sodium (men)	5	41.7%	9	56.3%
≥ SDT of 2,000 mg sodium (men)	7	58.3%	7	43.8%

Baseline n=33, T1 n=32, T2 n=28. Median (25th and 75th percentiles), all such values. n, all such values.
Data reported at 6 months reflects outcomes immediately post-intervention for the waitlist control arm, and 3 months post-intervention for the intervention arm.
Abbreviations: T, timepoint; AMDR, acceptable macronutrient distribution ranges; SDT, suggested dietary target; TEI, % of total energy intake.

Table 4 Biomarkers of cardiovascular risk, for a randomly selected sample of participants (50%), at each time point, per condition.

Serum biomarker	Baseline		3-mo follow-up		6-mo follow-up[a]	
	Intervention	Control	Intervention	Control	Intervention	Control
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Alkaline phosphatase (U/L)	72.9 (24.66)	69.67 (13.17)	69.5 (35.44)	70.86 (17.47)	59.5 (16.34)	69.8 (16.05)
Alanine aminotransferase (U/L)	53.4 (31.42)	32.83 (11.62)	32.17 (10.94)	31.71 (12.38)	39.5 (10.63)	31.8 (17.56)
Total bilirubin (μmol/L)	11.5 (2.99)	11.33 (1.75)	14.67 (1.75)	12.57 (2.99)	11.75 (3.20)	13.4 (2.70)
Total cholesterol (mmol/L)	4.19 (1.35)	4.43 (1.13)	4.68 (1.38)	4.47 (1.00)	5.45 (1.22)	4 (0.85)
Creatinine plasma (μmol/L)	87.9 (15.86)	80.5 (13.40)	90.17 (20.76)	82.29 (12.74)	87.75 (11.00)	83.8 (13.03)
Estimated Glomerular filtration rate (mL/min/1.73 m^2)	80.7 (13.77)	82.83 (11.11)	76.83 (16.24)	82 (9.85)	80 (10.10)	80.8 (12.28)
Gamma GT (Gamma glutamyltransferase; U/L)	38.8 (19.98)	26.67 (12.71)	23.5 (5.65)	27.29 (18.40)	25.75 (6.13)	37.6 (35.41)
HDL (high-density lipoprotein; mmol/L)	1.13 (0.23)	1.08 (0.24)	1.17 (0.27)	1.17 (0.28)	1.08 (0.17)	1.02 (0.08)
HbA1c (IFCC; mmol/mol)	40.7 (5.23)	48.83 (13.67)	38.83 (3.60)	45.71 (14.58)	39.5 (4.51)	48.4 (11.26)
LDL (low-density lipoprotein; mmol/L)	2.49 (1.28)	2.52 (0.88)	2.93 (1.36)	2.46 (0.97)	3.68 (1.15)	2.4 (0.64)
Sodium (mmol/L)	139.9 (1.97)	140 (1.27)	140.83 (2.23)	140 (1.00)	139.25 (4.86)	140.4 (1.14)
HbA1c (NGSP) %	5.87 (0.46)	6.62 (1.25)	5.72 (0.32)	6.33 (1.30)	5.78 (0.43)	6.58 (1.04)
Non-HDL cholesterol (mmol/L)	3.06 (1.36)	3.35 (0.99)	3.52 (1.45)	3.3 (1.01)	4.38 (1.36)	2.98 (0.80)
Potassium (mmol/L)	4.66 (0.32)	4.43 (0.46)	4.53 (0.31)	4.31 (0.34)	4.35 (0.41)	4.58 (0.43)
Total protein (g/L)	72.1 (3.51)	70.67 (2.66)	71.67 (3.56)	71 (2.31)	73.5 (1.92)	71.2 (4.09)
Total protein and albumin/globulin (U/L)	43.1 (2.47)	42.67 (1.63)	43.5 (1.87)	41.86 (1.57)	43 (0.82)	42.2 (2.86)
Triglycerides (mmol/L)	1.23 (0.45)	1.85 (0.72)	1.3 (0.37)	1.87 (1.14)	1.55 (0.51)	1.28 (0.62)
Urea (mmol/L)	6.47 (1.67)	6.02 (1.50)	7.53 (1.16)	5.51 (1.24)	6.75 (0.60)	6.36 (1.91)
Globulins (g/L) (TP-ALB)	29 (2.75)	28 (1.67)	28.17 (2.56)	29.14 (1.95)	30.5 (2.38)	29 (1.73)

[a]Six-month data reflects outcomes immediately post-intervention for waitlist control arm, and 3 months post-intervention for intervention arm.
Abbreviations: SD, standard deviation; HbA1c, glycated haemoglobulin; IFFC, International Federation of Clinical Chemistry and Laboratory Medicine; NGSP, National Glycohemoglobin Standardization Program.

formally withdrawn, or not attended any sessions beyond session 9. On this basis, there were 13 dropouts (27% of starting sample).

Follow-up measures

Tables 2–4 and Supplementary Table 2 detail the descriptive statistics for the outcome measures at each time point.

Program acceptability

Table 5 presents the results of the acceptability questionnaire, and open-ended comments added further insights. Overall, participants perceived the program to be a worthwhile and enjoyable investment of time, as further substantiated in the open-ended comments ("Interesting subjects weekly, terrific instructors and camaraderie among the group"). Participants were positive about the extent to which the program prepared them, and gave them confidence, to improve their PA and eating behaviours. Greater diversity in responses was evident for questions targeting the use of the football club setting. Most (67%) considered it important that the program was delivered in this setting ("It was all pretty good but being at the club and being a set time, it felt like teamwork"). Less than half (40%) rated it important that the program was male-only. Supplementary Table 3 presents participants' men's responses to questions about helpfulness of various program components. Goal setting, the Fitbit, learning about food labelling, and the Australian guide to healthy eating were rated as most helpful. The lowest helpfulness rating was for the alcohol session. Open-ended comments elaborated on this; one participant responded, "Alcohol, as I am a non-drinker" whereas another commented, "I have always been a drinker so, unfortunately, my alcohol habits are unchanged/unchangeable". Open-ended comments also highlighted the importance of the sense of shared experience and belonging in the group ("You did not feel alone, others experienced similar problems to yourself"). Several participants commented that they would have liked a greater exercise component ("I would like more time spent on PA. At least 50/50") and a mental health component ("perhaps some discussion is required around mental health post a CVD event").

Discussion

This feasibility trial demonstrates that the Aussie-FIT program is attractive to men with CVD and that it is possible to retain them in the program, suggesting that Fans in Training-style programs have promise for CVD secondary prevention. The

Table 5 Acceptability of the Aussie-FIT program by men who completed the program.

Statement	Mean (median, scale 1–7)	Frequency (%)	
		Agree	Neutral/disagree
The Aussie-FIT program was a worthwhile investment of time for me	6.15 (6.00)	39 (97.5)	1 (2.5)
The Aussie-FIT program was beneficial for me	6.08 (6.00)	39 (97.5)	1 (2.5)
I enjoyed the Aussie-FIT program	6.15 (6.00)	40 (100)	0 (0.0)
The program helped me to feel confident to use what we learnt to improve my eating	5.90 (6.00)	39 (97.5)	1 (2.5)
The program sufficiently prepared me to improve my eating	5.90 (6.00)	39 (97.5)	1 (2.5)
The program helped me to feel confident to use what we learnt to be regularly physically active	5.90 (6.00)	38 (95)	2 (5)
The program sufficiently prepared me to be regularly physically active	5.80 (6.00)	37 (92.5)	3 (7.5)
The Aussie-FIT program met my expectations	5.43 (6.00)	35 (87.5)	5 (12.5)
It was important to me that this program was delivered in association with the football club	5.08 (6.00)	25 (62.5)	14 (35)
It was important to me that the program was delivered at the football club facilities	5.13 (5.00)	27 (67.5)	13 (32.5)
It was important to me that Aussie-FIT was a male-only program	4.43 (4.00)	18 (45)	32 (55)

Participants answered all questions on 1–7 scale (from strongly disagree–strongly agree).
Abbreviation: Aussie-FIT, Aussie Fans in Training.

program attracted the target population, men with CVD and a health profile consistent with increased risk of a secondary event (i.e., raised systolic blood pressure, central adiposity, obesity). Descriptive statistics suggest a trend in decreases in these health markers following program participation among those in the intervention and waitlist control arms. However, the study was not powered to detect conclusive effectiveness of the program in reducing CVD risk.

Baseline PA values were higher than anticipated. On average, participants recorded 33 minutes of MVPA per day, which falls within the boundaries of 'sufficient' PA in most national and international guidelines (150–300 minutes per week [17]). However, 32% of participants participated in less than 30 minutes of MVPA per day and would be considered insufficiently active. This suggests that the program was successful in attracting some insufficiently active men, but also attracted a large proportion of men who were already active, an issue that would warrant attention in future trials.

Using Intake24 software to assess dietary intake was feasible and acceptable. However, data quality was potentially compromised, given the number of unviable energy intakes and other differences in results, when compared with estimated energy requirements for men of this age and weight [26]. At follow-ups, participants were given the option to complete the self-reported measures independently; it is not known whether participants watched the instructional video, which may have compromised data quality. Completion only with the support of a research assistant may be optimal.

Findings regarding program acceptability were very promising. Ongoing delivery of Aussie-FIT programs exclusively to men with CVD may not be sustainable, however, given the target sample size for this trial (n=72) was not achieved in the time available for recruitment. It may be more viable to deliver Aussie-FIT programs to men with *and* at risk of CVD together, given behaviour change requirements to prevent primary or secondary CVD are aligned. A fully powered trial is warranted, given the encouraging feasibility results from this study and previous Aussie-FIT pilot studies.

Retention rates at 6-month follow-ups (78%) highlight the importance of considering mechanisms to improve trial retention, if longer-term follow-ups are needed. Such approaches could include capitalising on the appeal of the football club setting, via arranging follow-ups to coincide with a club event. Participant adherence to the measurement protocols among those retained in the trial was overall very good, however, there was poor adherence among the selected sub-sample in providing a blood sample. This is likely attributed to the participant burden of attending a pathology facility in a different location to the other trial assessments.

Strengths and Limitations

Study strengths include the use of partnerships with community organisations in appealing (i.e., professional sport) settings to deliver a behaviour change intervention to a clinical population. The study utilised a range of metrics to explore the feasibility and acceptability of intervention and trial procedures.

Limitations include the under-representation of men of lower socio-economic status and men who identified as Aboriginal or Torres Strait Islander. More targeted approaches to recruiting and retaining men from diverse backgrounds is recommended in future trials, to address health inequalities [17]. In the case of Aussie-FIT, further consideration of how the program can be adapted to appeal to Indigenous men is warranted. Moreover, the creation of a program designed to be culturally safe and appealing to Indigenous men may be warranted. The study is also limited by the short follow-up; the study cannot provide any indication of whether longer-term follow-ups in a fully powered trial would be feasible and acceptable. There were no fidelity assessments included, to determine whether the trained coaches were delivering the program in accordance with the program delivery protocol. Finally, this feasibility trial does not assess the feasibility of running such programs long-term outside of a clinical trial setting. Although the sustained delivery of FFIT programs in Scotland [11] highlights the promise of such programs to be funded and sustained outside of trial conditions, implementation research is warranted to establish methods to enable sustainable implementation in Australian football settings.

Future Directions

In Australia, there are high rates of CVD among women, poorer outcomes and inequities in quality of care and research attention [28,29]. In the UK, Fans in Training-style programs also have demonstrated appeal to women [30]. Development and testing of an Aussie-FIT program for women would improve equity and contribute towards reducing notable inequities faced by women in cardiovascular care.

Prior to the initiation of this trial, we did not establish continuation criteria [31]. However, on the basis of the results from this feasibility trial, we propose progression is warranted, with minor modifications, as follows. Recruitment and uptake with men with CVD alone may be unfeasible for a larger trial, and we recommend including men with *or at risk of* CVD. Further consideration of how to 'pitch' the program, with input from insufficiently active men with a history of CVD, as well as stakeholders, would be warranted to increase uptake by less active men, for whom behaviour change may have increased value. The research procedures and assessment protocol were acceptable and adhered to, except for the requirement to attend a pathology clinic for biological markers of risk; for pragmatism, this could be modified to a point-of-care assessment of serum cholesterol levels. High ratings for intervention acceptability, feasibility and attendance rates warrant continuation with the

proposed intervention without modification. To our knowledge, there have been no studies comparing the effectiveness of Fans in Training-style programs to similar, non-sport-themed interventions. This could also be a consideration for future research.

Conclusion

The appeal of professional sport has potential to engage men with CVD with an interest in sport in health behaviour change. This study provides support for the feasibility and acceptability of Aussie-FIT and trial procedures for men with CVD, with minor modifications. A fully powered RCT of Aussie-FIT among men with or at risk of CVD is recommended, to explore the potential of this program as a means of primary and secondary CVD prevention for men in Australia. Parallel testing of implementation strategies via a hybrid-style design is required to maximise likely uptake and sustainability of the program in the long term.

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Conflicts of Interest

There are no conflicts of interest to disclose.

Appendices

Supplementary data associated with this article can be found, in the online version, at https://doi.org/10.1016/j.hlc.2024.03.012.

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