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The MOVE Frankston study: 24-Month follow-up of a randomized controlled trial of incentives and support to increase leisure center usage and physical activity

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ABSTRACT

Recreational physical activity (PA) facilities have the potential to deliver health benefits for surrounding communities, however little is known about the impact of marketing strategies to encourage their use. This study aimed to assess the effectiveness of two low intensity interventions aimed at promoting usage of a new multi-purpose recreation facility. A community-based randomized controlled trial with a 24-month follow up period was conducted with 1320 inactive adult residents of the City of Frankston, Victoria, Australia. Participants were randomized to a control, intervention 1 (information and attendance incentive) or intervention 2 (information, attendance incentives, personalized support) group. Primary outcomes were recreation facility attendance, purchase of facility membership and PA participation. Eight hundred and fifty-four (65%) participants completed 24-months follow up. Provision of incentives with personalized support was associated with greater attendance at the facility, as well as higher rates of membership. Those receiving incentives without additional support reported increases in stage of readiness to attend the facility. The interventions did not contribute to higher levels of PA, however those who became regular users of the facility were more likely to improve PA and meet the target of ≥150 min per week. Increased frequency and duration of promotion led to more regular attendance at the recreation facility, while those who attended regularly showed significant increases in PA. Incorporating recreation facilities within broader PA strategies, by engaging community members in a way that promotes more regular use of recreation facilities, will contribute to improvements in PA at a population level.

1. Introduction

Insufficient physical activity is recognized as one of the biggest public health problems of this century (Blair, 2009). Public health researchers and advocates have called for changes to the built environment, including parks, footpaths, trails, cycle lanes and recreation facilities, in response to this issue (Sallis et al., 2016; World Health Organization, 2013; National Heart Foundation of Australia, 2019). Numerous systematic reviews investigating the association of the built environment with physical activity (PA) have been undertaken, reporting that features such as mixed land use, high residential density, street connectivity, and physical infrastructure are key factors associated with increased PA (Bauman and Bull, 2007; McCormack and Shiell, 2011; Gebel et al., 2007). A prominent limitation highlighted in these reviews is the lack of longitudinal and intervention data, with most studies being cross-sectional (Bauman et al., 2012; O. Ferdinand et al., 2012). The need for longitudinal data is particularly important when considering the significant investment required to establish new

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infrastructure and facilities.

Multi-purpose recreation facilities can provide gym, swimming and other sport and leisure opportunities for communities, and usually require payment of an entry or membership fee. While several studies have evaluated the effects of government initiatives that provide free entry to these centers (Verhoef et al., 2016; Bolton et al., 2008), little is known about the impact of different marketing strategies on facility usage and PA participation. Investigating feasible and sustainable methods for promoting the use of recreation facilities, including commercial marketing techniques, is needed.

The Monitoring and Observing the Value of Exercise (MOVE) Frankston study was a randomized controlled trial (RCT) designed to assess the effectiveness of two marketing interventions to promote usage of the newly established Peninsula Aquatic Recreation Center (PARC) in Melbourne, Australia. PARC facilities include a 50-meter indoor pool, learn to swim pools, and an aquatic playground area. It is also equipped with a spa, sauna, gym, group exercise rooms and a wellness center offering massage and other therapies. The aim of the present study was to evaluate the impact of the MOVE interventions on PARC attendance and PA participation over a 24-month period. Secondary aims were to explore whether the interventions had a differential influence on men and women, and to investigate factors associated with facility usage over time.

2. Methods

2.1. Study design

This community-based RCT received ethics approval from the Monash University Human Research Ethics Committee (Project IDs: CF14/1148–2014000497 and CF14/2059–2014001074) and is registered with the Australian New Zealand Clinical Trials Registry (Trial ID: ACTRN12615000012572). The MOVE Frankston trial design and study methods have been reported previously (Newton et al., 2015) and are briefly summarized here.

2.2. Participants and recruitment

Adults aged 18 to 70 years were eligible for inclusion in the trial if they resided in the City of Frankston, Victoria, did not meet PA recommendations (i.e. completed<150 min of PA per week) and did not attend a recreation or exercise facility more than twice per week. The target sample size was estimated to be 1300 participants (500 in the control group and 400 in each of the two intervention groups) in order to observe with 95% confidence limits and 80% power a 10% difference in the primary outcome between the experimental groups, assuming that 10% of the control group would achieve this outcome.

2.3. Intervention

Participants were randomly assigned to the control group or one of the two intervention groups using a computer-generated random number sequence. Participants were not blinded to the group to which they were allocated, and three investigators (BJS, JN, RMS) responsible for managing the intervention elements were not blinded to participants' group allocation. Researchers conducting the follow-up surveys were blinded to the group to which participants were allocated.

The interventions were focused on examining whether a high and/or low level of personalized contact with individuals can drive PA and facility usage. All participants were exposed to general PARC promotion through advertising in local newspapers, billboards and letters to residents in the local area. Intervention groups 1 and 2 received an information pack related to PARC and a voucher for one free visit to PARC. Intervention group 2 additionally received a telephone follow-up call in the first six months encouraging participants to redeem the voucher or to continue their use of the facility, a quarterly newsletter about the benefits of regular PA at PARC, an additional free entry voucher, and PARC-branded birthday, Christmas and post cards. The design of these interventions was informed by Rogers' diffusion of innovations model (Rogers, 1962) and customer relationship management (CRM) methods (Verhoef, 2003). They were intended to be relatively low cost and to be easily replicable using affordable 'off-the-shelf' CRM systems that are widely used.

2.4. Demographic characteristics

The demographic and health characteristics of participants measured included sex, age, educational attainment, employment status, household composition and income, language spoken at home, residential proximity to PARC (calculated by mapping the distance by road from participants' residential address to PARC), and chronic disease status using the Functional Comorbidity Index (Groll et al., 2005).

2.5. Outcome measures

The primary outcomes of this trial were PARC attendance, PARC membership, and PA participation. Attendance was measured by asking participants whether they had visited PARC in the past 12 months, and if so, whether this was less than once per month, 1–2 times per month, 1–2 times per week, or 3 times per week or more. Participants were also asked whether they had purchased membership to PARC. The Exercise Recreation and Sport Survey (ERASS) (Australian Sports Commission, 2010) was used to measure the frequency and duration of structured physical activities in the preceding 12 months and 2 weeks. Secondary outcomes included stage of readiness to attend PARC (pre-contemplation, contemplation, preparation, action or maintenance) and social-cognitive determinants of PA including intention (Schüz et al., 2012), attitude (Ajzen, 2002), subjective norm (Ajzen, 2002), action planning (Sniehotta et al., 2005), self-efficacy (Armitage and Conner, 2001) and anticipated regret (Abraham and Sheeran, 2004). The social-cognitive determinants were measured on a 5-point Likert scale ranging from strongly agree to strongly disagree. Baseline measures were collected at the time of recruitment, and follow-up measurements were conducted using computer-assisted telephone interviewing methods at 12- and 24-months follow-up. This study reports results from the 24-month follow-up survey.

2.6. Statistical analysis

The number and proportion of participants who attended PARC once yearly or more, once monthly or more, and once weekly or more, were calculated. Data from the ERASS was used to calculate the total minutes of moderate- and vigorous-intensity PA undertaken by participants. These were classified into three groups: inactive (<20 min per week), low active (20–149 min per week) and meeting PA guidelines (150 min per week or more). The proportion of participants who progressed across these categories from baseline to 24 months was calculated. In addition, the proportions of participants in each stage of readiness to attend PARC and who had positive stage progression from baseline to 24-months was determined. The social-cognitive determinants of PA scales were dichotomized (agree vs neutral/disagree) and the proportions of participants reporting the characteristics were calculated. Univariable logistic regression was used to assess difference in the outcomes between control and intervention groups, and 95% confidence intervals were calculated. Comparisons across control and intervention groups were stratified by gender in order to explore intervention effect moderation, and recognizing the importance of gender differences in PA rates (Australian Bureau of Statistics, 2013). We further stratified by distance from PARC for the primary outcomes. Stepwise multiple linear regression (stepwise backward estimation) was used to identify predictors of PA and PARC attendance, with variables having a p-value of 0.1 or below in the univariable analysis included in the regression. To assess

possible bias from analysis of study completers only, we compared the intervention effects using this approach to those attained when all enrolled participants were included and baseline substitution was used for missing values at 24 months, and did not find any significant differences. Statistical analyses were performed using IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA). Statistical significance was assumed at $p < 0.05$.

3. Results

Between August and September 2014, a total of 1320 participants were enrolled in the study, of which 854 (65%) completed 24 months follow-up, including 356 participants in the control group, 252 in intervention group 1 and 246 in intervention group 2 (Fig. 1). Of the participants followed up at 24 months, 60% were female, approximately half were aged 55 years or older, two-thirds were educated at a tertiary level and only 2% spoke a language other than English at home. There were no significant differences in the characteristics of the participants in each group (Table 1), however those completing 24-month follow-up were more likely than those lost to follow-up to be aged 55 years and over, educated at a university level, not in full-time employment, and to have a household income below AU$80,000.

4. PARC attendance

There was a significantly higher proportion of study participants in intervention group 2 (14.2%) who attended PARC once per month or more compared to the control group (7.3%), as shown in Table 2. A higher proportion of participants in intervention group 2 (9.8%) and intervention group 1 (7.1%) reported attending PARC once a week or more, with odds ratios of 3.10 (95%CI 1.52–6.32) and 2.21 (95%CI 1.04–4.66), respectively, compared to the control group. For PARC membership, participants in intervention group 2 were significantly more likely to purchase membership than those in the control group. Characteristics of participants who purchased PARC membership are shown in Supplementary Table 1.

Stratification by gender revealed that men in intervention group 2 were significantly more likely than men in the control group to report

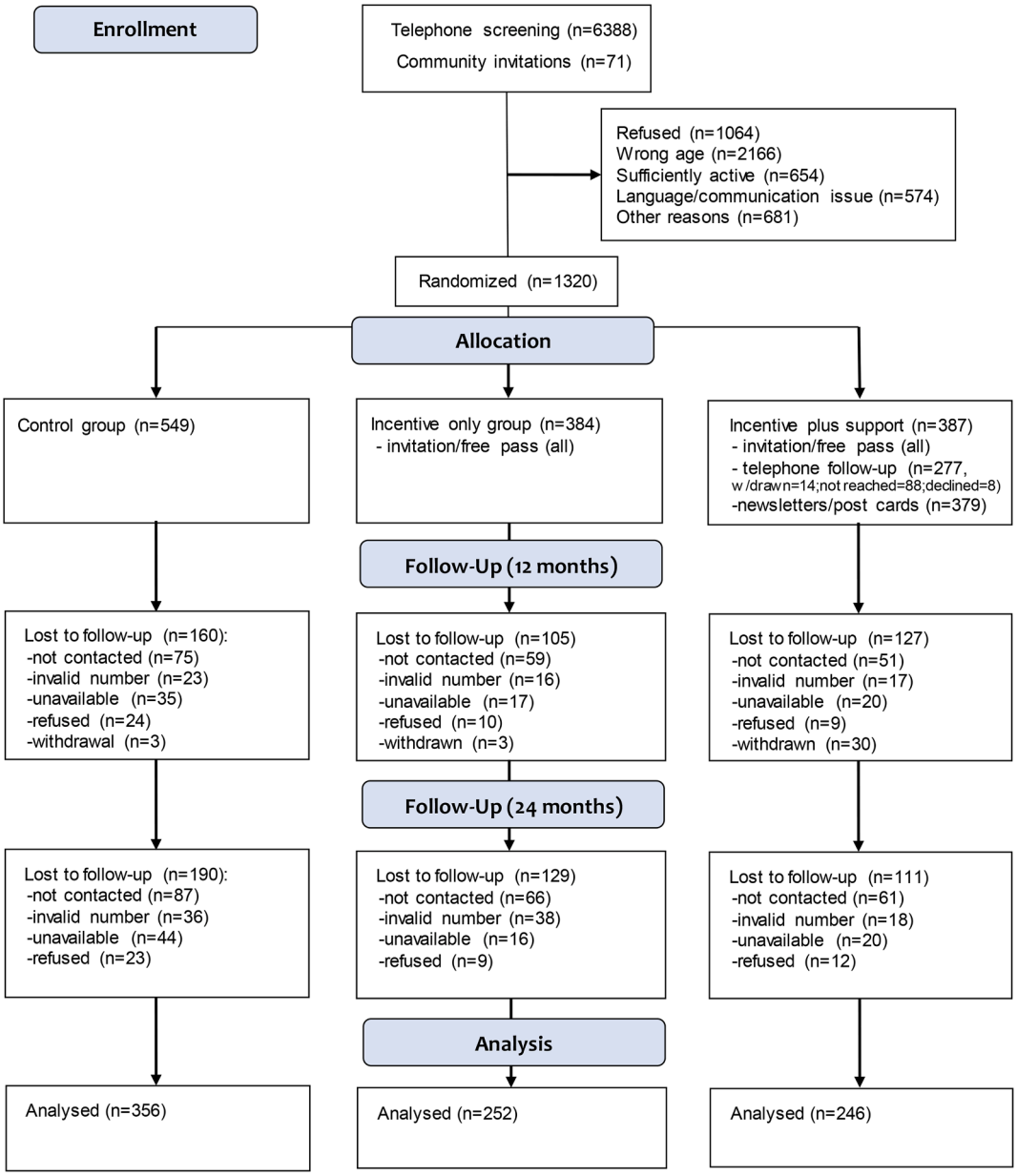


Fig. 1. CONSORT flow diagram.

Table 1
Characteristics of participants at 24 months follow-up.

Characteristic	Control (n = 356), n (%)	Intervention 1 (n = 252), n (%)	Intervention 2 (n = 246), n (%)	Total (n = 854), n (%)
Gender				
Female	214 (60.1)	153 (60.7)	149 (60.6)	516 (60.4)
Male	142 (39.9)	99 (39.3)	97 (39.4)	338 (39.6)
Age group (years)[a,b]				
18 – 34	30 (8.5)	18 (7.1)	15 (6.1)	63 (7.4)
35 – 54	128 (36.1)	90 (35.7)	96 (39.0)	314 (36.8)
≥55	197 (55.5)	144 (57.1)	135 (54.9)	476 (55.8)
Employment status[b]				
Full-time	120 (33.7)	77 (30.6)	84 (34.1)	281 (32.9)
Part-time	87 (24.4)	57 (22.6)	54 (22.0)	198 (23.2)
Other	149 (41.9)	118 (46.8)	108 (43.9)	375 (43.9)
Education[a,b]				
High school or less	102 (29.1)	96 (39.3)	90 (37.3)	288 (34.4)
Vocational qualification	151 (43.0)	79 (32.4)	88 (36.5)	318 (38.0)
University degree	98 (27.9)	69 (28.3)	63 (26.1)	230 (27.5)
Children in household[a,b]				
None	231 (65.1)	167 (66.5)	158 (64.2)	556 (65.3)
One or more	124 (34.9)	84 (33.5)	88 (35.8)	296 (34.7)
Household income (AUD)[a,b]				
≤39,999	86 (27.4)	69 (30.9)	55 (25.5)	210 (27.9)
40,000–79,999	131 (41.7)	81 (36.3)	85 (39.4)	297 (39.4)
≥80,000	97 (30.9)	73 (32.7)	76 (35.2)	246 (32.7)
Main language[a]				
English	336 (97.4)	238 (99.2)	230 (97.5)	804 (97.9)
Other	9 (2.6)	2 (0.8)	6 (2.5)	17 (2.1)
Distance from PARC[a]				
<5 km	135 (39.4)	117 (48.3)	91 (39.4)	343 (42.0)
≥5 kms	208 (60.6)	125 (51.7)	140 (60.6)	473 (58.0)
Chronic disease[a]				
None	82 (23.0)	69 (27.4)	60 (24.6)	211 (24.8)
One	95 (26.7)	59 (23.4)	60 (24.6)	214 (25.1)
Two or more	179 (50.3)	124 (49.2)	124 (50.8)	427 (50.1)
Baseline physical activity				
<20 min/wk	122 (34)	76 (30)	89 (36)	287 (34)
20–149 min/wk	137 (39)	107 (43)	95 (39)	339 (40)
≥150 mins/wk	97 (27)	69 (27)	62 (25)	228 (27)
Baseline stage of readiness for PARC				
Precontemplation	139 (39)	107 (43)	94 (38)	340 (40)
Contemplation	217 (61)	145 (58)	152 (62)	514 (60)

[a] data missing for participants

[b] difference with those lost to follow-up ($p < 0.05$)

attending PARC monthly or more, as well as weekly or more. Among women, those in intervention group 1 were more likely than controls to attend PARC monthly or more. Women in intervention group 2 were more likely to attend weekly or more and more likely to have purchased PARC membership compared to women in the control group.

Stratification by distance from PARC showed that there was a higher proportion of attenders among those who lived less than five kilometers from the facility, compared to those who lived further away, in all of the groups. Those in intervention group 2 who lived less than five kilometers from PARC were significantly more likely to attend at least once, and more likely to attend weekly or more, compared to the control group. Among those who lived five or more kilometers away from PARC, it was only those in intervention group 2 who showed a significantly increased likelihood of attending monthly or more, weekly or more, and purchasing membership.

4.1. Physical activity participation

At follow-up, intervention group 1 had a significantly higher proportion of participants in the low active category (20–149 mins/week) compared to the control group (OR 1.47, 95%CI 1.05–2.06) (Table 3). However, intervention group 1 also had a significantly lower proportion of participants who were sufficiently active (≥150 mins/week) compared to the control group (OR 0.69, 95%CI 0.49–0.97). Overall, intervention group 1 did not have a significantly higher proportion of participants than the control group who showed improvement in their level of physical activity, and this was also found for intervention group 2.

Similar to the overall group findings, gender stratification showed that compared to the controls, men in intervention group 1 were more likely to be in the low active category and less likely to be in the category meeting PA guidelines. No significant differences in PA outcomes were observed among women.

Stratification by distance from PARC revealed no significant effects among those living five or more kilometers from PARC. Those living within five kilometers showed results similar to the overall group findings, with those in intervention group 1 having a greater likelihood of being in the low active category and less likely to be in the category meeting PA guidelines.

4.2. Stages of readiness to use PARC

Table 4 shows the stages of readiness to attend PARC, with participants in intervention group 2 significantly more likely to be in the action or maintenance stages of PARC use compared to the control group. Intervention group 1 had a significantly greater proportion of participants progress in their stage of readiness to attend PARC compared to the control group.

Stratification by gender showed that men in intervention group 2 were more likely than those in the control group to be in the action or maintenance stage of PARC attendance. Among women, those in intervention group 2 were less likely than those in the control group to be in the precontemplation stage. Analysis of other social-cognitive determinants of PA (attitude, subjective norm, action planning, self-efficacy, anticipated regret) showed no differences between the groups.

4.3. Predictors of physical activity participation and PARC attendance

Table 5 shows the participant characteristics identified as significant independent predictors of PARC attendance, PA participation, and improvement in PA levels from baseline. For PARC attendance, participants residing<5 km from PARC were more likely to be regular users compared to those living 5 km or more away. Participants with high

Table 2
PARC attendance and PARC membership: univariable regression.

Group	Once or more, n (%)	Crude OR (95% CI)	Monthly or more, n (%)	Crude OR (95% CI)	Weekly or more, n (%)	Crude OR (95% CI)	Membership, n (%)	Crude OR (95% CI)
All								
Control	94 (26.4)	1.00	26 (7.3)	1.00	12 (3.4)	1.00	19 (5.3)	1.00
Intervention 1	76 (30.2)	1.20 (0.84,1.72)	29 (11.5)	1.65 (0.95,2.88)	18 (7.1)	2.21 (1.04,4.66)*	21 (8.3)	1.61 (0.85,3.07)
Intervention 2	75 (30.5)	1.22 (0.85,1.75)	35 (14.2)	2.11 (1.23,3.60)**	24 (9.8)	3.10 (1.52,6.32)***	28 (11.4)	2.28 (1.24,4.18)**
Gender								
Men (n = 338)								
Control	32 (22.5)	1.00	8 (5.6)	1.00	3 (2.1)	1.00	5 (3.5)	1.00
Intervention 1	25 (25.3)	1.16 (0.64,2.12)	6 (6.1)	1.08 (0.36,3.22)	5 (5.1)	2.47 (0.58,10.56)	9 (9.1)	2.74 (0.89,8.44)
Intervention 2	23 (23.7)	1.07 (0.58,1.97)	13 (13.4)	2.59 (1.03,6.52)*	9 (9.3)	4.74 (1.25,17.98)*	6 (6.2)	1.81 (0.54,6.10)
Women (n = 516)								
Control	62 (29.0)	1.00	18 (8.4)	1.00	9 (4.2)	1.00	14 (6.5)	1.00
Intervention 1	51 (33.3)	1.23 (0.78,1.92)	23 (15.0)	1.93 (1.00,3.71)*	13 (8.5)	2.12 (0.88,5.08)	12 (7.8)	1.22 (0.55,2.71)
Intervention 2	52 (34.9)	1.31 (0.84,2.06)	22 (14.8)	1.89 (0.97,3.66)	15 (10.1)	2.55 (1.09,5.99)*	22 (14.8)	2.48 (1.22,5.01)*
Distance from PARC								
<5km								
Control	41 (30.4)	1.00	16 (11.9)	1.00	7 (5.2)	1.00	13 (9.6)	1.00
Intervention 1	44 (37.6)	1.38 (0.82,2.33)	19 (16.2)	1.44 (0.70,2.95)	11 (9.4)	1.90 (0.71,5.07)	13 (11.1)	1.17 (0.52,2.64)
Intervention 2	41 (45.1)	1.88 (1.08,3.27)*	18 (19.8)	1.83 (0.88,3.82)	12 (13.2)	2.78 (1.05,7.35)*	14 (15.4)	1.71 (0.76,3.82)
>=5km								
Control	48 (23.1)	1.00	9 (4.3)	1.00	5 (2.4)	1.00	6 (2.9)	1.00
Intervention 1	28 (22.4)	0.96 (0.57,1.64)	8 (6.4)	1.51 (0.57,4.03)	5 (4.0)	1.69 (0.48,5.96)	7 (5.6)	2.00 (0.66,6.08)
Intervention 2	29 (20.7)	0.87 (0.52,1.47)	16 (11.4)	2.85 (1.22,6.65)*	11 (7.9)	3.46 (1.18,10.19)*	13 (9.3)	3.45 (1.28,9.30)*

*p < 0.05; **p < 0.01; ***p < 0.005

Table 3
Physical activity participation at 24 months and change in level of MVPA from baseline: univariable regression.

Characteristic	<20 min	Crude OR (95% CI)	20–149 min	Crude OR (95% CI)	≥150 min	Crude OR (95% CI)	Improvement in MPVA	Crude OR (95% CI)
All								
Control	115 (32.3)	1.00	110 (30.9)	1.00	131 (36.8)	1.00	105 (29.5)	1.00
Intervention 1	80 (31.7)	0.98 (0.69,1.38)	100 (39.7)	1.47 (1.05,2.06)*	72 (28.6)	0.69 (0.49,0.97)*	67 (26.6)	0.87 (0.60,1.24)
Intervention 2	65 (26.4)	0.75 (0.53,1.08)	88 (35.8)	1.25 (0.88,1.76)	93 (37.8)	1.04 (0.75,1.46)	87 (35.4)	1.31 (0.93,1.85)
Gender								
Men (n = 338)								
Control	42 (29.6)	1.00	31 (21.8)	1.00	69 (48.6)	1.00	48 (33.8)	1.00
Intervention 1	32 (32.3)	1.14 (0.65,1.98)	34 (34.3)	1.87 (1.05,3.33)*	33 (33.3)	0.53 (0.31,0.90)*	25 (25.3)	0.66 (0.37,1.17)
Intervention 2	23 (23.7)	0.74 (0.41,1.34)	32 (33.0)	1.76 (0.99,3.15)	42 (43.3)	0.81 (0.48,1.36)	41 (42.3)	1.43 (0.84,2.44)
Women (n = 516)								
Control	73 (34.1)	1.00	79 (36.9)	1.00	62 (29.0)	1.00	57 (26.6)	1.00
Intervention 1	48 (31.4)	0.88 (0.57,1.38)	66 (43.1)	1.30 (0.85,1.98)	39 (25.5)	0.84 (0.53,1.34)	42 (27.5)	1.04 (0.65,1.66)
Intervention 2	42 (28.2)	0.76 (0.48,1.20)	56 (37.6)	1.03 (0.67,1.59)	51 (34.2)	1.28 (0.81,2.00)	46 (30.9)	1.23 (0.78,1.95)
Distance from PARC								
<5km								
Control	39 (28.9)	1.00	39 (28.9)	1.00	57 (42.2)	1.00	36 (26.7)	1.00
Intervention 1	42 (35.9)	1.38 (0.91,2.34)	48 (41.0)	1.71 (1.01,2.89)*	27 (23.1)	0.41 (0.24,0.71)**	38 (32.5)	1.32 (0.77,2.28)
Intervention 2	27 (29.7)	1.04 (0.58,1.86)	25 (27.5)	0.93 (0.52,1.69)	39 (42.9)	1.03 (0.60,1.76)	29 (31.9)	1.29 (0.72,2.30)
>=5km								
Control	72 (34.6)	1.00	65 (31.3)	1.00	71 (34.1)	1.00	64 (30.8)	1.00
Intervention 1	36 (28.8)	0.76 (0.47,1.24)	48 (38.4)	1.37 (0.86,2.18)	41 (32.8)	0.94 (0.59,1.51)	27 (21.6)	0.62 (0.37,1.04)
Intervention 2	37 (26.4)	0.68 (0.42,1.09)	53 (37.9)	1.34 (0.85,2.10)	50 (35.7)	1.07 (0.68,1.68)	53 (37.9)	1.37 (0.87,2.15)

MVPA – moderate and vigorous physical activity
*p < 0.05

school or lower education were more likely to attend PARC compared to those with vocational qualifications. Of the social-cognitive variables, participants with positive attitude and action-planning were more likely to attend PARC at least monthly compared to those who responded neutral or negative, with odds ratios of 3.26 (95%CI 1.26–8.43) and 1.79 (95%CI 1.05–3.03), respectively.

Table 4
Stage of readiness at 24 months and change in stage from baseline: univariable regression.

Characteristic	Precontemplation	Crude OR (95%CI)	Contemplation/ Preparation	Crude OR (95%CI)	Action/ Maintenance	Crude OR (95% CI)	Progression in stage	Crude OR (95%CI)
All								
Control	222 (62.4)	1.00	112 (31.5)	1.00	22 (6.2)	1.00	70 (19.7)	1.00
Intervention 1	135 (53.6)	0.70 (0.50,0.97)*	95 (37.7)	1.32 (0.94,1.85)	22 (8.7)	1.45 (0.79,2.68)	67 (26.6)	1.48 (1.01,2.17)*
Intervention 2	134 (54.5)	0.72 (0.52,1.01)	84 (34.1)	1.13 (0.80,1.60)	28 (11.4)	1.95 (1.09,3.50)*	59 (24.0)	1.29 (0.87,1.91)
Gender								
Men (n = 338)								
Control	94 (66.2)	1.00	43 (30.3)	1.00	5 (3.5)	1.00	26 (18.3)	1.00
Intervention 1	55 (55.6)	0.64 (0.38,1.08)	36 (36.4)	1.32 (0.76,2.27)	8 (8.1)	2.41 (0.76,7.60)	26 (26.3)	1.59 (0.86,2.95)
Intervention 2	61 (62.9)	0.87 (0.51,1.48)	25 (25.8)	0.80 (0.45,1.43)	11 (11.3)	3.51 (1.18,10.43)*	19 (19.6)	1.09 (0.56,2.10)
Women (n = 516)								
Control	128 (59.8)	1.00	69 (32.2)	1.00	17 (7.9)	1.00	44 (20.6)	1.00
Intervention 1	80 (52.3)	0.74 (0.48,1.12)	59 (38.6)	1.32 (0.86,2.04)	14 (9.2)	1.17 (0.56,2.45)	41 (26.8)	1.41 (0.87,2.30)
Intervention 2	73 (49.0)	0.65 (0.42,0.98)*	59 (39.6)	1.38 (0.89,2.13)	17 (11.4)	1.49 (0.74,3.03)	40 (26.8)	1.42 (0.87,2.32)

*$p < 0.05$

For PA participation, males were more likely to meet PA guidelines than females (OR 0.52, 95%CI 0.38–0.71). Adults aged 18–34 years were more likely to meet PA guidelines compared to those aged 35–54 years and those aged 55 and older. Participants with a positive attitude towards PA, action-planning and self-efficacy were more likely than those with neutral or negative responses to these social-cognitive variables to meet PA guidelines. Furthermore, participants who attended PARC on a monthly or more basis were more likely than non-attenders to meet physically active guidelines (OR 2.29, 95%CI 1.43–3.69). PARC attendance on a monthly or more basis was also the only variable found to be a significant predictor of progression in PA level from baseline to follow-up (OR 1.94, 95%CI 1.19–3.17).

5. Discussion

This community-based RCT demonstrated that information, free entry pass incentives and personalised follow-up, as used with intervention group 2, was associated with more regular attendance at PARC, as well as higher rates of PARC membership after 24-months. Participants in intervention group 1 who received the minimal intervention of a PARC information pack and one free entry pass only reported increases in their stage of readiness to attend PARC, with slightly more participants attending weekly or more compared to the control group. Overall, intervention group 1 did not have a significantly higher proportion of participants than the control group who showed improvement in their level of physical activity, and this was also found for intervention group 2.

Analysis by gender indicated that women were more responsive to promotion of this recreational facility, such that minimal information and incentives resulted in more regular attendance. Yet, further prompting and follow-up as used in intervention 2 was required for men to attend at least monthly. Among women increased exposure to prompting and encouragement was associated with purchasing of memberships, however this was not the case for men.

Overall, there was a greater proportion of women across groups attending PARC monthly or more and weekly or more compared to men, however a higher proportion of men achieved sufficient PA (≥150 min per week) compared to women across all groups. This is consistent with population data concerning differences in recreation center usage and PA participation between genders, which show that women are more likely to undertake PA in a fitness, leisure or indoor sports center compared to men, while men have higher levels of PA overall (Australian Sports Commission, 2010; Australian Institute of Health and Welfare, 2017). This suggests that despite women appearing to respond more to the interventions, the impact was not sufficient to overcome the gender differences in levels of PA.

Living in close proximity (less than five kilometres) to PARC was found to be a predictor of attendance at the center over 24-months, consistent with findings from a longitudinal study investigating predictors of PARC attendance at 12-months (Smith et al., 2019). This is in line with other studies which have shown that individuals utilise facilities close to their home more than anywhere else, and that access to facilities is a key factor determining whether or not a facility will be utilised (Giles-Corti and Donovan, 2002; Humpel et al., 2002). For participants who lived further away, barriers such as travel time, travel cost and perceived convenience of facilities may be important factors that influenced the use of facilities (Bethancourt et al., 2014; Whipple et al., 2019). In light of this, a notable finding in this study when group comparisons were stratified by proximity to PARC, was that the more intensive intervention involving prompting and follow-up maintained its significant impact upon regular attendance and purchasing of PARC membership among those living five kilometres or more from the center. This suggests that exposure to prompts and encouragement can mitigate the effects of living further away from the facility.

Analysis of predictors of PA revealed that for the overall participant population, monthly or more frequent PARC attendance was a significant predictor of both sufficient PA and improvement in PA level. This is consistent with previous findings that the use and availability of recreation facilities is associated with a greater level of PA (Van Cauwenberg et al., 2011; Van Cauwenberg et al., 2018; Moran et al., 2014). However, the interventions trialled in this study were not sufficient to generate a level of attendance that resulted in a higher level of PA participation among those who received these. This indicates a continued need to identify wide reaching and effective strategies to increase usage of recreation infrastructure and facilities such as PARC, within broader PA strategies.

Across both the intervention and control groups, other predictors for achieving sufficient PA levels in this study included being younger and exhibiting positive attitudes, action-planning and self-efficacy traits. This is supported by other studies which show that positive attitudes towards exercise are associated with greater PA (Poobalan et al., 2012; Hagger et al., 2002). A meta-analysis of observational and interventional studies which investigated the impact of action planning on PA found that across 40 studies, action planning was significantly

Table 5
Predictors of physical activity achievement, improvement from baseline and PARC attendance: multivariable analysis.

Characteristic	150 mins or more Adjusted OR (95%CI) N = 833	PA improvement Adjusted OR (95% CI) N = 753	PARC attendance (monthly or more) Adjusted OR (95% CI) N = 796
Allocation			
Control	1.00		1.00
Intervention 1	0.60 (0.41,0.88)**		1.29 (0.71,2.33)
Intervention 2	1.06 (0.73,1.53)		2.17 (1.23,3.84)**
Gender			
Male	1.00		
Female	0.51 (0.37,0.70)***		
Age group (years)			
18 – 34	1.00		
35 – 54	0.31 (0.18,0.56)***		
≥55	0.51 (0.28,0.92)*		
Education			
High school or less			1.00
Vocational qualification			0.27 (0.14,0.51)***
University degree			0.89 (0.53,1.51)
Distance from PARC			
<5 km			1.00
≥5 kms			0.40 (0.25,0.64)***
Attitude			
Neutral/ negative	1.00		1.00
Positive	1.75 (1.07,2.88)*		3.36 (1.30,8.73)*
Action planning			
Neutral/ negative	1.00		1.00
Positive	1.49 (1.06,2.11)*		1.74 (1.02,2.96)*
Self-efficacy			
Neutral/ negative	1.00		
Positive	2.35 (1.20,4.61)*		
Frequency of attendance			
Non-attenders	1.00	1.00	
Occasional	1.31 (0.88,1.95)	0.94 (0.62,1.42)	
Monthly or more	2.20 (1.35,3.59)**	1.94 (1.19,3.17)**	

*p < 0.05; **p < 0.01; ***p < 0.001.

associated with increased PA (Carraro and Gaudreau, 2013). Self-efficacy has also been shown to have a positive effect on PA participation (Bauman et al., 2012; Hagger et al., 2002; Duncan and Mummery, 2005). In this study, positive intention to exercise did not have any association with PA participation, and similar findings have been reported in other studies (Poobalan et al., 2012; Sheeran, 2002). It was notable, however, that there were no significant differences in any of these factors across intervention groups in this study. This suggests that the intervention content and delivery could be refined in order to better address important social and cognitive determinants of PA participation.

Strengths of this RCT were completion of follow up over 24-months, and inclusion of a community sample of inactive persons with characteristics consistent to those of the Victorian adult population (Department of Health and Human Services, 2016). The intervention strategies trialled have good potential for ongoing implementation as they require minimal resources and can be easily integrated into existing CRM systems. This is particularly important considering the substantial investment required to develop and maintain multi-purpose recreational facilities. However, there are some limitations to this study. First, measurement of PA participation and PARC attendance was by self-report, however it is anticipated that any measurement error across groups is likely to have been non-differential. Recall and estimates of time spent performing PA by participants may be subject to bias, with previous studies showing both under- and over-reporting occurring through self-report measures, such that there is no clear direction of bias that can be corrected (Prince et al., 2008). A further limitation is the loss of approximately one-third of participants from baseline to follow-up, resulting in a participant population at 24-months that was older, more educated and with a lower income than the original pool of participants, however, these losses were consistent across experimental groups.

The present study reports results from the long-term follow-up of an RCT of information, incentives and follow-up support to increase recreation center usage and PA, showing that increased frequency and duration of promotion lead to more regular attendance at the recreation facility. The interventions did not contribute to higher levels of sufficient PA, however across the whole sample those who became regular users of the facility were more likely to improve PA and meet the recommendation of ≥150 min per week. Incorporating recreation facilities within comprehensive PA strategies, and application of systems approaches to identify critical intervention points to promote the accessibility and use of these venues, may generate improvements in PA at a population level (Bellew et al., 2020). This has implications for local government authorities, which could invest in frequent and ongoing promotion of these facilities and the provision of financial subsidies for facilities to enable fee reduction or incentive schemes to encourage new users. Health care providers are also potentially important partners, which could be achieved through referral linkages between health care providers and facility providers. Ongoing evaluation of the health and economic benefits of these types of investments are required.

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7. Data sharing statement

Extra data is available upon request by contacting the corresponding author.

8. Contributorship statement

KEM contributed to the statistical analysis, drafting and revision of the manuscript. JN, FN, AB, RJT, MTE, RMS and AM contributed to the study conception and design, recruitment of participants, management of study proceedings, data collection and revision of the manuscript. BJS contributed to the study conception and design, recruitment of participants, management of study proceedings, data collection, drafting and revision of the manuscript. KEM and BJS act as guarantors to affirm that this manuscript is an honest, accurate and transparent account of the study being reported; that no important aspects of the study have been omitted and that any discrepancies from the study as planned (and, if relevant, registered) have been explained. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pmedr.2021.101539.

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