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### Vitality club

van de Vijver, Paul L; Wielens, Herman; Slaets, Joris; van Bodegom, David

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# Vitality club: a proof-of-principle of peer coaching for daily physical activity by older adults

Paul L. van de Vijver,<sup>1,2</sup> Herman Wielens,<sup>3</sup> Joris P.J. Slaets,<sup>1,4</sup> David van Bodegom<sup>1,2</sup>

<sup>1</sup>Leyden Academy on Vitality and Ageing, Rijnsburgerweg 10, 2333 AA Leiden, The Netherlands

<sup>2</sup>Department of Public Health and Primary Care, Leiden University Medical Center, 2300 RC Leiden, The Netherlands

<sup>3</sup>Stichting FreeWheel, Zuiderkruis 4, 7071 TB Ulf, The Netherlands

<sup>4</sup>Center for Geriatric Medicine, University Medical Center Groningen, Groningen, 9700 RB Groningen, The Netherlands

Correspondence to: Paul L. van de Vijver, [vijver@leydenacademy.nl](mailto:vijver@leydenacademy.nl)

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## Abstract

Many age-related diseases can be prevented or delayed by daily physical activity. Unfortunately, many older adults do not perform physical activity at the recommended level. Professional interventions do not reach large numbers of older adults for a long period of time. We studied a peer-coach intervention, in which older adults coach each other, that increased daily physical activity of community dwelling older adults for over 6 years. We studied the format and effects of this peer coach intervention for possible future implementation elsewhere. Through interviews and participatory observation we studied the format of the intervention. We also used a questionnaire ( $n = 55$ ) and collected 6-min walk test data ( $n = 261$ ) from 2014 to 2016 to determine the motivations of participants and effects of the intervention on health, well-being and physical capacity. Vitality Club is a self-sustainable group of older adults that gather every weekday to exercise coached by an older adult. Members attend on average 2.5 days per week and retention rate is 77.5% after 6 years. The members perceived improvements in several health measures. In line with this, the 6-min walk test results of members of this Vitality Club improved with 21.7 meters per year, compared with the decline of 2–7 meters per year in the general population. This Vitality Club is successful in durably engaging its members in physical activity. The members perceive improvements in health that are in line with improvements in a physical function test. Because of the self-sustainable character of the intervention, peer coaching has the potential to be scaled up at low cost and increase physical activity in the increasing number of older adults.

## Keywords

Peer coaching, Physical activity, Older adults, Proof-of-principle

## INTRODUCTION

Many age-related diseases can be prevented or delayed by a healthy lifestyle [1–4]. Especially daily physical activity has been found effective at preventing and treating many age-related diseases and risk factors such as cardiovascular disease, hypertension, obesity, type 2 diabetes, osteoporosis, and sarcopenia [5–7]. In older adults it also reduces depression, anxiety, the risk of falls and increases mobility, quality of life and longevity [7–9]. Unfortunately, most older adults do not reach the recommended level of 150 min of physical activity per week [10–12]. As a result, physical inactivity is currently a major cause of age-related health problems [13]. Different professional interventions to increase physical activity

## Implications

**Practice:** Self-supporting *peer* coach groups are effective to increase daily physical activity and consequently increase well-being and health.

**Policy:** Policymakers or interventionists should consider using *peers* alongside or instead of professionals to increase physical activity of large numbers of older adults.

**Research:** Future research should be aimed at identifying the replicability of the intervention and factors to promote *peer* coaching in populations.

given by physicians, physiotherapists, and nurses are successful during the intervention period and have been found to have substantial health benefits. However, these professional interventions generally only reach a small part of the target population. Furthermore, when the intervention stops, physical activity returns to baseline and the beneficial effects vanish in most participants [14, 15]. Due to a scarcity of time, money and healthcare professionals, older adults cannot receive a continuous professional intervention for the rest of their lives [16, 17]. Therefore, other more sustainable options to increase daily physical activity for the rising number of older people have to be explored.

Among the alternatives are online interventions, but the first intervention studies in this field have not been able to increase daily physical activity for large numbers of people [18, 19]. Furthermore, most of these studies are not specially designed for older adults [20, 21]. Phone based intervention is another option that has been studied in older adults and has proven effective in promoting physical activity in some studies [22]. However, studies show that face-to-face social support and buddy systems are successful in increasing physical activity and most preferred by older people [23–26]. One particularly promising intervention not constraint by a scarcity of professionals is peer coaching [27–30].

Peer coaching is a face-to-face intervention to reach a common goal given by a non-professional, who has a common background with the recipient, either through a similar life experience or other shared characteristics. The strength of peer-coaching lies in empathy and using the experiential knowledge of the peer coach, to understand the other peers wishes, motivations, possibilities and limitations. The most successful and widely-known peer coaching initiative is Alcoholics Anonymous, with more than two million members spread over 150 countries [31–33]. Although this initiative is secondary prevention, peer coaching could also be effective in primary prevention such as increasing physical activity in older adults.

We studied how peer coaching is used to sustainably increase daily physical activity of a group of older adults in a proof-of-principle in Ulft, a rural town in The Netherlands, where a group of older adults gathers daily for 1 hr physical activity coached by a peer. Here, we describe the *FreeWheel* club, the first Vitality Club, by examining the format, the motivations of the members and the effects of participation on health, well-being, and physical capacity. The analysis of this successful proof-of-principle could provide a basis for future implementation elsewhere.

## METHODS

### Format of the intervention

The *FreeWheel* club was founded by an older adult in September 2010 as a public benefit organization. At the time of the study the club consisted of 69 older adults, of which 63 were member and 6 were founder or peer coach. The *FreeWheel* club is situated in a rural area with around ten thousand inhabitants. The goal of the *FreeWheel* club was to be a self-sustainable, easily accessible and low-cost club with daily exercise especially tailored for older adults, but people of all ages were allowed to participate.

The setting, daily routine and social interaction of the group was documented through participatory observation. Semi-structured in-depth interviews were conducted by the first author with the two initiators of the *FreeWheel* club and the four peer coaches. Removed additionally, membership administration was used to identify date of enrolment of members. Exact date of enrolment and disenrolment of former members was unknown. Based on the interviews, a questionnaire was designed and sent to all 63 members of the *FreeWheel* club (55 respondents). The questionnaire was divided in three sections. The first section was to assess personal characteristics about the behavior of the member. What days did the member attend sessions of the *FreeWheel* club, how often did they drank coffee after a session and what members did they know before joining the *FreeWheel* club.

### Motivations

To study the motivations to join the *FreeWheel* club and to continue to participate we used free-form questions in the questionnaire ( $n = 55$ ). The second section of the questionnaire assessed the experienced motivations and barriers to become a member and keep attending the *FreeWheel* club. Participants could provide as many reasons as they could think of. The full questionnaire is available in English in the supplementary information. The original questionnaire was in Dutch. Ethical approval was obtained from the Institutional Review Board of the Leyden Academy on Vitality and Ageing. All participants provided informed consent on paper.

### Effects of the intervention

To assess the effect of the *FreeWheel* club we used the questionnaire and data on 6-min walk tests (6MWT), which measures the maximum distance a person can walk in 6 min. The questionnaire was used to assess self-reported effects. In the third section of the questionnaire, members rated their health and well-being to reflect the status before membership and their current status. Health and well-being included weight, social events per week and quality of life. All aspects can be seen in Table 2. The sub-sample size of the self-reported effects are similar to the size of the motivation analysis.

The 6MWT was used to objectively assess the effects of the *FreeWheel* club on functional capacity. This test is commonly used to measure functional capacity in older adults and is associated with all-cause mortality [34–36]. A person is told to walk the largest distance possible in 6 min without running. The test is conducted over a distance of 50 meters that can be covered multiple times back and forth. Participants get feedback concerning the remaining time. The *FreeWheel* club conducted this test during sessions between November 2014 and April 2016 at 13 timepoints. Resulting in 261 results from 53 unique members. The test was an initiative of a peer coach. They wanted to conduct the test monthly, but the time interval was not strict, and together with the summer break, it resulted in 13 tests in 18 months.

Differences in self-perceived general health and well-being were analyzed using a paired sample *t*-test. The effect of membership of the *FreeWheel* club on the 6-min walk test was analyzed using a multi-level regression model. The determinants in level one of the model were location of the test and time in years from first measurement, which was at November 21, 2014. The level two determinants in the analysis were weight, height, gender, age at enrolment and years of membership at first measurement. Level one determinants change within an individual for each measurement, level two determinants are static within an individual and only vary between individuals. All predictors in the models were treated as fixed effects except for the intercept, which had

a random effect in the model. For additional analyses, we stratified the study group by age at enrolment and 6-min walk distance at first measurement by dividing the group at the 50th percentile for the three variables. We stratified membership duration at first measurement in two groups, the first group had a membership duration of less than 1 year at first measurement and the other group had a longer membership duration. There was no missing data in the survey. Missing data in the 6-min walk test was *missing at random* and was not considered problematic for the MIXED model analysis [37]. Statistical analyses are performed with IBM SPSS Statistics for Macintosh, Version 22.0, Armonk, NY: IBM Corp.

## RESULTS

### Format of the intervention

Table 1 shows the characteristics of the members. All persons actively involved in the creation of the *FreeWheel* club and the regular peer coaches were interviewed individually once and excluded from the questionnaire. Of the remaining 63 people that were eligible for the questionnaire, 55 members (87.3%) responded. There are more women (73%) than men (27%) in the *FreeWheel* club. Next, the majority is unemployed (72%), mostly because of retirement. The formal age of retirement in the Netherlands was 65 up until 2013 and is gradually increasing to 67 in 2021. Also, there are more low educated members than middle or high educated. The median net disposable income of *FreeWheel* club members lies between 2,000 and 2,500 euro, which is similar to the general population in the Netherlands [38]. Finally, at the moment of the study the membership duration was on average 2.8 years (*SD* 1.8).

Figure 1 shows the growth of the *FreeWheel* club over the past 6 years. The first session was preceded by advertisements in the community paper and flyers at the local soccer club. Moreover, friends and family of the initiators were asked to join the session. This resulted in ten people. Members of the *FreeWheel* Club live no further than 6 kilometres from the rendezvous. A total of 89 people ever joined the *FreeWheel* club, of which 20 members stopped, resulting in a group of 69 older adults at the time of the study. This means the *FreeWheel* club has a retention rate of 77.5% over a period of 6 years.

The *FreeWheel* club gathers every weekday, at 9 o'clock AM at the local soccer club or athletic association. On average, 28 people exercise together for an hour instructed by a peer. Every meeting, an average of 55% of the people stay afterwards for a coffee. For most members, this social interaction with fellow members is an integral part of the *FreeWheel* club. If the weather conditions are too bad to exercise outside, the group moves to the sports canteen or stadium stands and exercises there. The regular peer coaches both lead 2 days. One day is

Table 1 | Characteristics of *FreeWheel* Club Members

<i>FreeWheel</i> club members, <i>n</i>	63
Completed 6MWT at least once, <i>n</i> (total measurements)	53 (261)
Survey respondents, <i>n</i> (%)	55 (87%)
Gender, <i>n</i> (%)	
Male	15 (27%)
Female	40 (73%)
Age in years, mean ( <i>SD</i> )	65.5 (6.2)
Male	68.1 (3.7)
Female	64.5 (6.6)
Body Mass Index <sup>a</sup> , mean ( <i>SD</i> )	25.5 (5.2)
Male	26.0 (2.8)
Female	25.3 (6.1)
Marital status, <i>n</i> (%)	
Unmarried and never married	2 (4%)
Married	48 (87%)
Divorced	1 (2%)
Widowed	4 (7%)
Employed status, <i>n</i> (%)	
Employed	9 (17%)
Unemployed	3 (6%)
Retired	35 (66%)
Other	6 (11%)
Educational level, <i>n</i> (%) <sup>b</sup>	
Low	26 (48%)
Middle	15 (28%)
High	13 (24%)
Disposable income per household, <i>n</i> (%)	
<500	4 (11%)
500–1000	4 (11%)
1000–1500	3 (9%)
1500–2000	5 (14%)
2000–2500	5 (14%)
2500–3000	3 (9%)
>3000	11 (31%)
Number of sessions attended per week <sup>d</sup> , mean ( <i>SD</i> )	2.5 (1.0)
Years of membership, <i>n</i> (%)	
<1 year	9 (16%)
1–2 years	20 (36%)
2–3 years	5 (9%)
3–4 years	6 (11%)
4–5 years	8 (15%)
5–6 years	7 (13%)

Characteristics of *FreeWheel* club members. Some categories do not add up to 55 because of missing data.

<sup>a</sup>Based on self-reported weight and height.

<sup>b</sup>Low educational level is an educational degree not higher than lower secondary education. Middle educational level is everything between low and high educational level. High educational level defined as having a degree from a University or Higher Professional Education.

<sup>c</sup>Disposable income per household is total income per household minus taxes and social fees.

<sup>d</sup>Self-reported attendance.

different from the other days as the *FreeWheel* club goes walking together and that nonmembers are also allowed to participate.

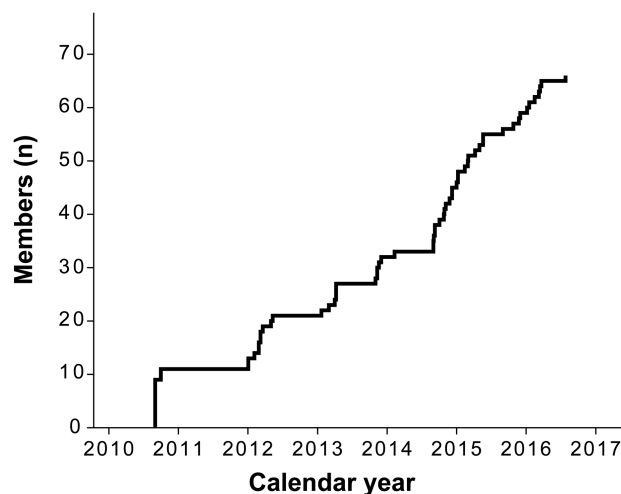


Fig. 1. | Growth of the *FreeWheel* club. The line shows the cumulative number of members in time.

The first peer coach is 79 years old. He makes sure that shoulder, chest, abdomen, back, pelvis, and leg muscles will be used at least once during training. The second regular peer coach is 68 years. He is a retired athletic trainer, who focuses on strength, flexibility, speed, coordination, and stamina to ensure optimal function in activities of daily living. He is assisted by his wife during the sessions. The two regular peer coaches are substituted during the summer holiday by two extra peer coaches. All peer coaches have experience in giving training to groups, either as instructor of some sport or yoga teacher. There was no program manual, and all peer coaches used their own experience to develop a physical activity program. The flexibility and differences between the sessions of different peer coaches could be an essential part of the *FreeWheel* club.

In the beginning the *FreeWheel* club received a donation of 3,000 euros from the local soccer club. This money was used to buy a collection of sports materials. Structural costs come from the rent for the soccer field and the peer coaches. The regular peer coaches receive a small fee of five euros per hour, which is the maximum allowed fee for volunteers in the Netherlands. Members must pay one euro per week for membership and two euros per quarter for the rent of the soccer field, totaling at 15 euros per quarter.

### Motivations

The three most common motivations for joining the *FreeWheel* club sessions were the wish to become physically fitter ( $n = 46$  [84%]), to have social interaction ( $n = 18$  [33%]) and the fact that the *FreeWheel* club exercised outside ( $n = 10$  [18%]). The three most common motivations to continue attending the *FreeWheel* club sessions were similar to the motivations to join the *FreeWheel* club, however social interaction was mentioned almost twice as much.

The most mentioned reason to stay a member was the positive change in physical capacity experienced by the members ( $n = 51$  [93%]). Second and third most common motivations were again social interaction and the outside setting ( $n = 34$  [62%] and  $n = 15$  [27%], respectively).

### Effects of the intervention

Table 2 shows the self-reported effects on health and well-being after joining the *FreeWheel* club. There was a significant increase in days of physical activity. Females reported a significant decrease in weight. Self-rated measures of quality of sleep, quality of life, physical capacity, and knowledge of healthy lifestyle all improved significantly.

As an objective measure of physical capacity, a total of 13 6MWT over a period of one and a half year were conducted during regular sessions with members who were present at that session. A total of 261 6MWT results of 53 unique members were collected. Only including the first test, members of the *FreeWheel* club walked on average 670 meters in 6 min ( $SD$  54.1 m). We used a multilevel regression model to estimate the effect of membership of the *FreeWheel* club on 6-min walk distance. During November 2014 and April 2016, the period when the 6-min walk tests were conducted, results increased with 21.7 meters per year (95% CI 10.8–32.6,  $p < .001$ ). In a stratified analysis dividing the group in the 50th percentile for age, both younger (age 40.4–63.7) and older (age 64.0–74.1) members had similar increments of respectively 20.7 (95% CI 6.4–35.0,  $p = .005$ ) and 21.3 meters per year (95% CI 3.5–39.1,  $p = .020$ ). Stratification by 6-min walk distance at first measurement (550 m–670 m vs. 675 m–785 m) yielded similar results. Members who were in their first year of membership at first measurement benefitted more than those who were member for a longer period at first measurement,

**Table 2** | Self-Reported Effects on Health and Well-Being After Joining the *FreeWheel* Club

	Before ( <i>SE</i> )	After ( <i>SE</i> )	<i>p</i>
Days with more than 30 min of physical activity per week ( <i>n</i> )	1.8 (0.3)	3.5 (0.2)	<.01
BMI			
Male	26.0 (0.8)	25.6 (0.7)	.47
Female	25.3 (1.1)	24.4 (0.8)	.02
Days per year ill ( <i>n</i> )	2.1 (0.5)	1.5 (0.3)	.57
Falls per year ( <i>n</i> )	2.0 (1.7)	0.2 (0.1)	.30
General practitioner consults per year ( <i>n</i> )	1.8 (0.3)	1.7 (0.2)	.80
Social events per week ( <i>n</i> )	3.2 (0.4)	3.6 (0.4)	.12
Days feeling lonely per week ( <i>n</i> )	0.1 (0.1)	0.0 (0.0)	.32
Quality of sleep (score 1–10)	7.1 (0.2)	7.4 (0.2)	.01
Physical capacity (score 1–10)	6.7 (0.2)	7.6 (0.1)	<.01
Knowledge of healthy lifestyle (score 1–10)	7.3 (0.1)	7.8 (0.1)	<.01
Quality of life (score 1–10)	7.9 (0.1)	8.1 (0.1)	<.01

Boldface indicates statistical significance ( $p < .05$ ). *p*-values are derived from a paired sample *t*-test.

37.5 meter per year (95% CI 22.8–52.2,  $p < .01$ ) and 9.7 meter per year, respectively (95% CI –6.5 to 25.8,  $p = .24$ ). Additionally, members that stayed for coffee afterwards in more than half of the attended sessions benefitted more (26.6 meters per year, 95% CI 9.8–41.4,  $p < .01$ ) compared to those who stayed for coffee less than half of the attended sessions (16.9 meters per year, 95% CI 2.0–31.8,  $p = .03$ ). As a final analysis, we also studied whether people who attended more often had higher increases in 6-min walking test. We found that every extra day of average weekly attendance resulted in an increase of walking distance of 8.2 meters, although this was not significant (95% CI –12.7 to 29.1,  $p = .43$ ).

Figure 2 shows the effect of membership of the *FreeWheel* club on the 6-min walk distance. Data points connected by a dashed line represent one individual. The straight line represents the average increase as calculated by the multilevel regression.

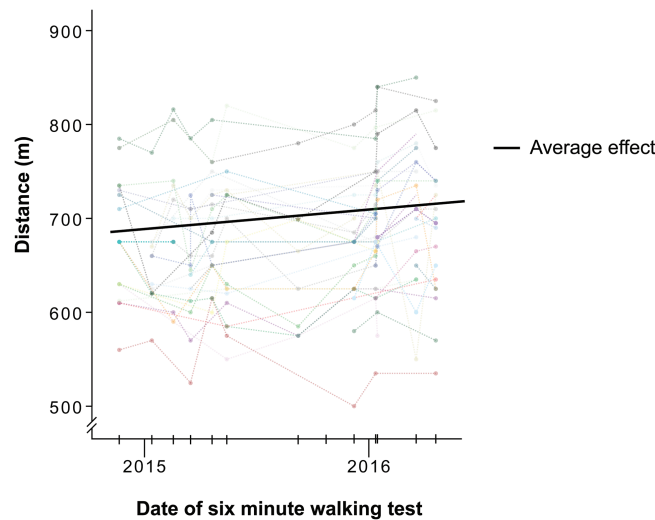
## DISCUSSION

The *FreeWheel* club is a peer coaching initiative that increases daily physical activity in 69 older adults and has been self-sustainable for almost 6 years. There is a high representation of lower educated individuals, which is important because low educated individuals are less physically active, have higher disease burden and are less likely to be reached by traditional interventions [39–41]. The members perceive improvements in health and well-being since they became member of the *FreeWheel* club. In line with this, the members of the *FreeWheel* club improve their 6-min walk distance with 21.7 meters every year. While in the general population there is a decline of 2–7 meters per year [42–44]. Several studies show that distance walked in 6 min is associated with all-cause mortality and that declining results is an independent predictor [36, 45]. Even

though 6MWT results are associated with mortality risk, improving the 6MWT results is likely, but not certainly, improving the mortality risk.

Several limitations need to be considered in this proof-of-principle. First, the *FreeWheel* club originated spontaneously in the community through the initiative of older people and the use of older peer-coaches. The downside however, is that it was never set up as a study from the beginning and some measures could therefore only be taken retrospectively. Second, the *FreeWheel* club is situated in a rural town. Small towns are known for having tight communities and high levels of social control. It is unclear whether this is of influence on the *FreeWheel* club, and in what direction this effect works. However, in Cuba there are 12,903 *Circulos de Abuelos*, which are clubs similar to the *FreeWheel* club, with 820,976 members in 2011 [46, 47]. This suggests that the reproduction of the initiative in more places and on a larger scale is possible. Finally, we observed a single club, therefore there was no way to compare different clubs and find common factors of success. Substantial part of this proof-of-principle was retrieved from interviewing the initiator, cofounder, and four peer-coaches. They had to recall most answers from memory. To reduce the chance of an optimistic presentation and events being omitted, we conducted more than one extensive in-depth interview and used objective data, such as the membership administration and the 6-min walk test, to support statements where possible.

The self-reported effects of the *FreeWheel* club need to be interpreted carefully. Results could be influenced by recall bias, because several members joined the *FreeWheel* club under the assumption that the *FreeWheel* club would yield them a health benefit. Consequently, they are more likely to report a health benefit in the self-perceived score. Most importantly, the 6-min walk test also showed a significant



**Fig. 2.** | Participation in the *FreeWheel* club and 6-min walk distance. On the x-axis are the timepoints when the *FreeWheel* club conducted the 6-min walk tests. On the y-axis the distance walked in 6 min (meters). Data points connected by a dashed line represent one individual. The straight line is the average increase in 6-min walk distance of all members during the study period calculated by a multi-level regression model adjusted for age at enrolment, years between enrolment and first measurement, that is, November 21, 2014 (membership duration), sex, height, weight, and location of test (soccer field or all-weather running track).

improvement in physical capacity. Even though the objective measures are in line with the self-reported measures, the self-reported measures before and after the *FreeWheel* club were placed on the same page in the survey, which could have increased the possibility that members reported social desirable answers on the self-reported measures of health and well-being. However, it is generally accepted that daily physical activity improves health, so it is likely that the perceived improvements are based on real physical improvements.

Where most studies show a moderate decline in 6-min walk distance of 2–7 meter per year in the general population, the participants in our study show an increase of 21.7 meters per year [42–44]. Both older and younger members experience a similar improvement when joining the *FreeWheel* club. We did find that members of the *FreeWheel* club improved more in the first year of membership than later. This suggests that part of the ageing process is due to detraining. Therefore, members improve the most in the beginning when they go from unfit to fit and after that year they maintain their fitness. Finally, members who more often stayed for a cup of coffee seemed to improve more than those who stayed less often for coffee, suggesting an important role of the social engagement of the *FreeWheel* club.

Four limitations must be taken into account about the 6-min walk tests. First, the tests have been conducted at 13 timepoints between November 2014 and April 2016 while the *FreeWheel* club already started in 2010. Therefore, some members are tested in their fourth or fifth year of membership duration while others are tested in their first year of membership, and we find that first year members improve

more than longer members. Second, higher attendance rate was associated with higher increases in the 6-min walking test, although this was not significant. Third, we do not know the number of dropouts during November 2014 and April 2016. It is more likely that dropouts are people with declining physical capacity and health. In total we estimated a dropout rate of 22.5% in 6 years, which is relatively low compared to other interventions of physical activity and exercise referral schemes, where the attrition rate could be as high as 80% per year [48, 49]. Finally, the 6-min walk tests are conducted during regular sessions, meaning that members that attended more sessions per week were more likely to be present during a 6-min walk tests. This could result in an overrepresentation of more active members in the 6-min walk tests and consequently an overestimation of the beneficial effect of the intervention on 6-min walk test. However, the 53 members that performed the 6-min walk test once or more had an average attendance rate of 2.7 days per week, which is only slightly higher than the average of the whole group.

## CONCLUSION

We conclude that the *FreeWheel* club has shown successes in retaining engagement in this group of older adults and may have a similar effect among other older adults. The members perceive improvements in health that are in line with improvements in a physical function test. It seems likely that the concept can be implemented elsewhere, but the design of the current study was not suitable to investigate this. To study reproducibility, a new Vitality Club must be founded in another place based on the

format of the *FreeWheel* club and studied over time. If successful, this format can be scaled up and more groups of older adults could start their own group and deliver a self-sustainable, low cost and effective intervention to increase daily physical activity to older adults everywhere. This would be a preventive equivalent of successful peer coach intervention such as the Alcoholics Anonymous and an answer to the demographic challenge in modern time with the increasing age-related health problems, loneliness, and healthcare costs.

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#### Compliance with Ethical Standards

**Conflict of Interest:** Paul L. van de Vijver, Herman Wielens, Joris P. J. Slaets, and David van Bodegom have no conflict of interest to report.

**Authors' Contribution:** *Study concept and design:* Paul L. van de Vijver, Joris P. J. Slaets, and David van Bodegom; *Statistical analyses:* Paul L. van de Vijver, Joris P. J. Slaets, and David van Bodegom; *Interpretation of results:* All authors; *Drafting of the manuscript:* All authors.

**Ethical Approval:** Ethical approval was received from the Institutional Review Board of the Leyden Academy on Vitality and Ageing. All participants provided informed consent on paper.

## References

- Knoops KT, de Groot LC, Kromhout D, et al. Mediterranean diet, lifestyle factors, and 10-year mortality in elderly European men and women: the HALE project. *JAMA*. 2004; 292(12): 1433–1439.
- O'Flaherty M, Buchan I, Capewell S. Contributions of treatment and lifestyle to declining CVD mortality: why have CVD mortality rates declined so much since the 1960s? *Heart*. 2013; 99(3): 159–162.
- Paffenbarger RS Jr, Hyde RT, Wing AL, Lee IM, Jung DL, Kampert JB. The association of changes in physical-activity level and other lifestyle characteristics with mortality among men. *N Engl J Med*. 1993; 328(8): 538–545.
- Lindström J, Peltonen M, Eriksson JG, et al.; Finnish Diabetes Prevention Study (DPS). Improved lifestyle and decreased diabetes risk over 13 years: long-term follow-up of the randomised Finnish Diabetes Prevention Study (DPS). *Diabetologia*. 2013; 56(2): 284–293.
- Penedo FJ, Dahn JR. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Curr Opin Psychiatry*. 2005; 18(2): 189–193.
- Warburton DE, Nicol CW, Bredin SS. Health benefits of physical activity: the evidence. *CMAJ*. 2006; 174(6): 801–809.
- Vogel T, Brechat PH, Leprêtre PM, Kaltenbach G, Berthel M, Lonsdorfer J. Health benefits of physical activity in older patients: a review. *Int J Clin Pract*. 2009; 63(2): 303–320.
- Gremaux V, Gayda M, Lepers R, Sosner P, Juneau M, Nigam A. Exercise and longevity. *Maturitas*. 2012; 73(4): 312–317.
- Taylor AH, Cable NT, Faulkner G, Hillsdon M, Narici M, Van Der Bij AK. Physical activity and older adults: a review of health benefits and the effectiveness of interventions. *J Sports Sci*. 2004; 22(8): 703–725.
- World Health Organisation. *Prevalence of insufficient physical activity*. 2010. [http://www.who.int/gho/ncd/risk\\_factors/physical\\_activity\\_text/en/](http://www.who.int/gho/ncd/risk_factors/physical_activity_text/en/). Accessed: 2017.
- World Health Organisation. *Global recommendations on physical activity for health*. 2010. [http://apps.who.int/iris/bitstream/10665/44399/1/9789241599979\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/44399/1/9789241599979_eng.pdf) ISBN: 978 92 4 159 997 9 Accessed: 2017 dec
- Sun F, Norman IJ, While AE. Physical activity in older people: a systematic review. *BMC Public Health*. 2013; 13(1): 449.
- Blair SN. Physical inactivity: the biggest public health problem of the 21<sup>st</sup> century. *Br J Sports Med*. 2009; 43(1): 1–2.
- Katherine S. Hall, Richard Sloane, Carl F. Pieper, et al. Long-Term Changes in Physical Activity Following a One-Year Home-Based Physical Activity Counseling Program in Older Adults with Multiple Morbidities, *Journal of Aging Research*. 2011; 308407, 9, 2011. doi:10.4061/2011/308407.
- van der Bij AK, Laurant MG, Wensing M. Effectiveness of physical activity interventions for older adults: a review. *Am J Prev Med*. 2002; 22(2): 120–133.
- Aluttis C, Bishaw T, Frank MW. The workforce for health in a globalized context—global shortages and international migration. *Global health action*. 2014; 7(1): 23611.
- Maher CA, Lewis LK, Ferrar K, Marshall S, De Bourdeaudhuij I, Vandelanotte C. Are health behavior change interventions that use on-line social networks effective? A systematic review. *J Med Internet Res*. 2014; 16(2): e40.
- Norman GJ, Zabinski MF, Adams MA, Rosenberg DE, Yaroch AL, Aitenza AA. A review of eHealth interventions for physical activity and dietary behavior change. *Am J Prev Med*. 2007; 33(4): 336–345.
- Devi R, Powell J, Singh S. A web-based program improves physical activity outcomes in a primary care angina population: randomized controlled trial. *J Med Internet Res*. 2014; 16(9):e186.
- Richards J, Thorogood M, Hillsdon M, Foster C. Face-to-face versus remote and web 2.0 interventions for promoting physical activity. *Cochrane Database Syst Rev*. 2013; 9: Cd010393.
- Müller AM, Khoo S. Non-face-to-face physical activity interventions in older adults: a systematic review. *Int J Behav Nutr Phys Act*. 2014; 11(1): 35.
- McNeill LH, Kreuter MW, Subramanian SV. Social environment and physical activity: a review of concepts and evidence. *Soc Sci Med*. 2006; 63(4): 1011–1022.
- Booth ML, Bauman A, Owen N, Gore CJ. Physical activity preferences, preferred sources of assistance, and perceived barriers to increased activity among physically inactive Australians. *Prev Med*. 1997; 26(1): 131–137.
- Burton NW, Khan A, Brown WJ. How, where and with whom? Physical activity context preferences of three adult groups at risk of inactivity. *Br J Sports Med*. 2012; 46(16):1125–1131.
- Short CE, Vandelanotte C, Duncan MJ. Individual characteristics associated with physical activity intervention delivery mode preferences among adults. *Int J Behav Nutr Phys Act*. 2014; 11(1): 25.
- Pérez-Escamilla R, Hromi-Fiedler A, Vega-López S, Bermúdez-Millán A, Segura-Pérez S. Impact of peer nutrition education on dietary behaviors and health outcomes among Latinos: a systematic literature review. *J Nutr Educ Behav*. 2008; 40(4): 208–225.
- Rossmann B. Breastfeeding peer counselors in the United States: helping to build a culture and tradition of breastfeeding. *J Midwifery Womens Health*. 2007; 52(6): 631–637.
- Joseph DH, Griffin M, Hall RF, Sullivan ED. Peer coaching: an intervention for individuals struggling with diabetes. *Diabetes Educ*. 2001; 27(5): 703–710.
- Ginis KA, Nigg CR, Smith AL. Peer-delivered physical activity interventions: an overlooked opportunity for physical activity promotion. *Transl Behav Med*. 2013; 3(4): 434–443.
- Humphreys K, Blodgett JC, Wagner TH. Estimating the efficacy of Alcoholics Anonymous without self-selection bias: an instrumental variables re-analysis of randomized clinical trials. *Alcohol Clin Exp Res*. 2014; 38(11):2688–2694.
- Kaskutas LA. Alcoholics anonymous effectiveness: faith meets science. *J Addict Dis*. 2009; 28(2): 145–157.
- Wilson B. *Alcoholics Anonymous: Big Book*. AA World Services; 2015 Publisher: Alcoholics Anonymous World Services 4th edition ISBN: 978-1893007161 Location: New York, New York, United States.
- Casanova C, Celli BR, Barria P, et al.; Six Minute Walk Distance Project (ALAT). The 6-min walk distance in healthy subjects: reference standards from seven countries. *Eur Respir J*. 2011; 37(1): 150–156.
- Yazdanyar A, Aziz MM, Enright PL, et al. Association between 6-minute walk test and all-cause mortality, coronary heart disease-specific mortality, and incident coronary heart disease. *J Aging Health*. 2014; 26(4): 583–599.
- Ingle L, Cleland JG, Clark AL. The long-term prognostic significance of 6-minute walk test distance in patients with chronic heart failure. *Biomed Res Int*. 2014; 2014: 505969.
- Ibrahim JG, Molenberghs G. Missing data methods in longitudinal studies: a review. *Test (Madr)*. 2009; 18(1): 1–43.
- Statistics Netherlands Statline. Income, consumption, wealth of households: key figures; National Accounts [Dataset]. Available at <http://statline.cbs.nl/2014>. Accessed 2017
- Shaw BA, Spokane LS. Examining the association between education level and physical activity changes during early old age. *J Aging Health*. 2008; 20(7): 767–787.
- Droomers M, Schrijvers CT, Mackenbach JP. Educational level and decreases in leisure time physical activity: predictors from the longitudinal GLOBE study. *J Epidemiol Community Health*. 2001; 55(8): 562–568.
- Frohlich KL, Potvin L. Transcending the known in public health practice: the inequality paradox: the population approach and vulnerable populations. *Am J Public Health*. 2008; 98(2): 216–221.



41. Britto RR, Probst VS, de Andrade AF, et al. Reference equations for the six-minute walk distance based on a Brazilian multicenter study. *Braz J Phys Ther.* 2013; 17(6): 556–563.
42. Troosters T, Gosselink R, Decramer M. Six minute walking distance in healthy elderly subjects. *Eur Respir J.* 1999; 14(2): 270–274.
43. Iwama AM, Andrade GN, Shima P, Tanni SE, Godoy I, Dourado VZ. The six-minute walk test and body weight-walk distance product in healthy Brazilian subjects. *Braz J Med Biol Res.* 2009; 42(11):1080–1085.
44. Yazdanyar A, Aziz MM, Enright PL, et al. Association between 6-minute walk test and all-cause mortality, coronary heart disease-specific mortality, and incident coronary heart disease. *J Aging Health.* 2014; 26(4): 583–599.
45. Quiñones RG, de Armas MA. Envejecimiento, políticas sociales y sectoriales en Cuba. *Ponencia presentada en Seminario Internacional sobre Políticas gerontológicas, Buenos Aires, Argentina.* 2010.
46. Benítez Pérez ME. Envejecer en Cuba: mucho más que un indicador demográfico. *Revista Novedades en Población.* 2015; 11(22): 10–19.
47. Gidlow C, Johnston LH, Crone D, James D. Attendance of exercise referral schemes in the UK: a systematic review. *Health Educ J.* 2005; 64(2): 168–186.
48. Wallace JP, Raglin JS, Jastremski CA. Twelve month adherence of adults who joined a fitness program with a spouse vs without a spouse. *J Sports Med Phys Fitness.* 1995; 35(3): 206–213.