Effects of a Controlled Pedometer-Intervention Trial for Low-Active Adolescent Girls

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ABSTRACT

SCHOFIELD, L., W. K. MUMMERY, and G. SCHOFIELD. Effects of a Controlled Pedometer-Intervention Trial for Low-Active Adolescent Girls. *Med. Sci. Sports Exerc.*, Vol. 37, No. 8, pp. 1414–1420, 2005. **Purpose:** This intervention compares the effectiveness of daily step count targets with time-based prescription for increasing the health-related physical activity of low-active adolescent girls. **Methods:** We assigned participants (N = 85, mean age 15.8 ± 0.8 yr) depending on school attended to a control (CON), pedometer (PED), or minutes (MIN) group. The intervention groups were involved in a 12-wk physical activity self-monitoring and educative program. The only difference between the intervention groups was that the PED group set daily step count targets whereas the MIN group set daily time-based goals for physical activity involvement. Pre-, mid-, and postintervention changes in physical activity (4-d blinded step count and 3-d physical activity recall) and body mass index (BMI) were assessed using a series of 3 (group assignment) × 3 (time) ANOVA. Where significant interactions were found, separate follow-up simple main effects tests were used. **Results:** At postintervention, only the PED group had significantly increased their total activity as measured by a 4-d step count, when compared with the control (P = 0.03, ES = 0.13). The group, time, and interaction effects for 4-d step count were significant, indicating that although both the participants in the PED and the MIN groups significantly increased their step count across the 12-wk intervention (P = 0.00–0.01), the participants in the PED group had a greater increase at the midintervention time point (P = 0.04, ES = 0.10). No pre-, mid-, or postintervention changes were reported in any group for BMI (F = 1.18, P = 0.32). **Conclusion:** The use of pedometers and daily step count targets with low-active adolescent girls may result in short-term (6 wk) enhanced physical activity related outcomes when compared with traditional time-based physical activity prescriptions. However, both interventions appear to result in similar improvements in physical activity when duration of the observation is extended to 12 wk. **Key Words:** SENIOR HIGH SCHOOL, STEP COUNT, PHYSICAL ACTIVITY, GOAL SETTING

Collectively, young people are the most active of all age-groups. However, research indicates that girls in mid-to-late adolescence are at-risk due to their minimally active lifestyles (18,21). Although some girls are sufficiently active for health benefits, many are not. Within schools and the wider community, there is a strong emphasis placed on sport and vigorous exercise. As such, young people do not have a comprehensive nor sophisticated understanding of lifestyle physical activity. Despite the intuitive appeal of presenting adolescent girls with opportunities for sport and vigorous exercise, in reality, this practice consistently excludes those girls at the sedentary end of the physical activity continuum.

To date, physical activity promotion for adolescents has included school (9,17), community (18,21), and physician-based (16) interventions. School-based settings have been the most widely utilized, specifically physical education (PE) interventions in primary and/or lower high school (3,8,13,14). Certainly, PE classes present an ideal opportunity for physical activity and health promotion as well as research. Nevertheless, both anecdotal and empirical evidence (refer below) suggests that low-active girls opt out of PE at the first opportunity. American data from the Youth Risk Behavior Surveillance Survey demonstrate that for girls in grades 9 to 12, participation in daily PE classes declines from 73 to 26% (26).

Despite this, there have been few interventions aimed at senior high school students who are not enrolled in PE. A contemporary review of the effects of physical activity intervention in youth concluded that published intervention trials have produced moderate increases in physical activity (19). However, the authors note a scarcity of interventions that promote physical activity participation during late adolescence (19).

We believe that targeting minimally active adolescent girl's immediately before they leave high school may be one way to arrest the age-related decline in physical activity already present as well as combating the further drop-off in

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Submitted for publication May 2004.
Accepted for publication March 2005.

0195-9131/05/3708-1414/0
MEDICINE & SCIENCE IN SPORTS & EXERCISE®

DOI: 10.1249/01.mss.0000174889.89600.e3

physical activity that occurs during transition from high school (19). Furthermore, we contend that using pedometers as a motivational device may present a novel and nonthreatening way of engaging those girls with the most to gain from increasing their physical activity. Pedometers are popular as a measurement tool with physical activity researchers (20,25,28), however, to date there is only one published study that has specifically used pedometers as an intervention tool with youth (6).

The purpose of this study was to pilot the efficacy of using a pedometer as the basis of a time efficient, yet effective noncurriculum school-based program. The Girls Stepping Out Program (GSOP) was aimed at increasing physical activity in previously low-active senior high school girls. For comparison purposes a second intervention group that used a similar but time-based approach to increasing physical activity was included in the study design.

METHODS

Participants. A descriptive study was conducted with 415 year 11 and 12 girls from three Central Queensland (Australia) high schools. The high schools were selected because of their similarities in terms of size, type, and geographic locations. Over 90% of all year 11 and 12 girls attending the schools participated. The purpose of this larger study was to determine average daily pedometer step counts in a cross-sectional sample of older adolescent girls. For the present study, we selected a subset of 90, low-active girls. Selection criteria were that the girls were apparently healthy (no diagnosed medical condition that would prevent physical activity) and that they were low-active. Low-active was defined as being in the group ($N = 30$) of girls from each of the three participating schools who took the least amount of steps recorded over a specified 4-d period in the original descriptive sample.

Following this procedure, 90 girls were initially approached to participate in the present study, with 85 girls commencing the program (control group = 30, pedometer intervention group = 27, and minutes intervention group = 28). Written informed consent and approval for this study was obtained from all student participants and their parents/caregivers. Ethical clearance was given by the human ethics review panel of the principal researcher's university.

After deletions for incomplete, unusable, or missing data, 68 girls were included in data analyses. Criteria for inclusion were attendance at a least four of the six weekly intervention group meetings (excluding control group) and provision of complete data on all dependent variables. Data from a total of 22 participants were discarded, five of whom did not start the program, three for reasons of nonattendance at intervention meetings, and 14 for incomplete or missing data. No significant differences between excluded and nonexcluded participants on baseline measures of activity, BMI, and age were found.

Study design/intervention description. A quasi-experimental control design was used. Participants from each of the three schools were placed in three different groups. Assignment of school to control (CON), pedometer intervention (PED), or minutes intervention (MIN) group was done at random.

The intervention was implemented in July through October of 2002. After assignment of intervention type, the principal researcher met separately with the MIN and PED groups and organized smaller groups of six to eight girls. This resulted in four groups per intervention type. All groups ($N = 8$) met once per week for approximately 30 min at the agreed time for 6 wk (adoption phase). All meetings took place at the allocated school and were held immediately before or after school, or during lunchbreak.

The weekly meetings were led by either the principal researcher or the same female research assistant; each taking four groups (two from each intervention type). Both the principal researcher and the female research assistant collaborated extensively to ensure delivery of a consistent style, message and structure of the intervention sessions. To track program compliance, attendance logs were taken at all meetings. To encourage optimal attendance at testing, participant incentives in the form of movie tickets were given to all participants at mid- and postintervention.

During the first meeting all participants received a personal logbook, (artwork designed by senior art class of one of the participating schools) that included a 12-wk log and information about how to be more active on a daily basis, tips for overcoming barriers, and injury/illness prevention strategies such as drinking plenty of water and stretching after exercise. Both the PED and MIN group log books were identical except that the MIN books referred to minutes of daily activity and the PED books referred to step counts. The PED groups were given their pedometer during the first session as well as being told their average daily step count (as taken at baseline). The MIN groups were given an indication of their activity level as assessed by the 3-d physical activity recall (3DPAR) at baseline.

Participants were encouraged to systematically increase their amount of daily physical activity by either step count or time-based prescription over the course of the intervention. Guidance was given in helping the participants to set realistic goals based on individual baseline data. Specifically, participants of the PED group were encouraged to increase their activity by a daily average of 1–2000 steps for each week, until they reached an average of at least 10,000 steps per day. Participants in the MIN group were encouraged to add a daily average of 10–15 min of activity for each week, until they reached a daily average of at least 30–60 $\text{min}\cdot\text{d}^{-1}$. These overarching goals were loosely based on current physical activity guidelines suggesting that youth should accumulate 30–60 $\text{min}\cdot\text{d}^{-1}$ of physical activity (2).

Group meetings followed an identical format each week (refer to Table 1), where the 30-min period was broken into three, 10-min time slots. The first 10 min were used to review and discuss each participant's previous week's goals: What was the goal? Was the goal met? Why or why not? During the 10-min educative component, a range of topics were covered, including healthy eating (see Table 1

TABLE 1. Summary of GSOP (pedometer and minutes intervention).

Week of Intervention	Intervention Sessions	Measurement
0		Baseline
1 (Adoption phase)	Group meeting Introduction Goal setting of either minutes or steps for coming week	
2	Group meeting Review of previous week's physical activity Education (healthy eating) Goal setting	
3	Group meeting Review Education (Benefits of physical activity) Goal setting	
4	Group meeting Review Education (Barriers to physical activity and time management) Goal setting	
5	Group meeting Review Education (Motivation and positive thinking) Goal setting	
6	Group meeting Review Education (Adherence) Goal setting	Midintervention
7 (Maintenance phase)		
8	Participants receive personalised postcards	
9		
10	Participants receive personalised postcards	
11		
12	Participants receive personalised postcards	Postintervention

for a full list of topics). The group leaders followed a basic one-page handout to ensure consistency across groups. The final 10 min of each session were allocated to planning the coming week's physical activity: What was each participant's step or minutes goal? How was the goal going to be achieved? What barriers might need to be overcome to achieve the goal?

During weeks 7–12 (maintenance phase), the focus changed to maintaining increased activity levels. Participants received a total of three reminder-to-be-active postcards at their home address. Each postcard included a physical activity tip as well as a brief hand written individualized word of encouragement signed by their group leader.

Measurements. Measurements for this study were collected at baseline (week 0), at the end of the intervention phase (week 6), and on completion of the maintenance phase (week 12). All measurements occurred simultaneously across the three groups.

Physical measurements. Physical measurements were conducted using trained research assistants. Body mass index (BMI) was calculated from height and weight measures, and weight classifications were determined via international age-specific cut points for overweight and obesity (4). Using standard anthropometric tape (Lufkin), waist circumference was measured at the level of the umbilicus. Right arm, sitting, blood pressure was measured using an Omron vital signs monitor. An indication of cardiorespiratory fitness was calculated by using the Rockport fitness walking test (RFWT) and the equation developed by Kline and colleagues (10,29). The 1-mile walk test was conducted on school fields with all participants wearing Polar heart rate monitors.

Sealed SW700 Yamax Digiwalker pedometers recorded the number of steps taken over a 4-d period (including the weekend). Pedometer-determined step counts are considered to be an accurate and valid method of determining the actual number of daily steps taken (1,5). Research has indicated that objective measurement of physical activity in youth requires four to five consecutive days of measurement to provide an acceptable level of reliability (24). Participants were excluded from the study if they did not wear the pedometer (i.e., off for more than 4 h in total) for the full 4 d of data collection. A recent study by Vincent and Pangrazi (27) found that when children knew a sealed pedometer was monitoring their physical activity, there were no significant changes to their normal pattern of activity.

Self-reported measurements. Participant characteristics were measured using a demographic and health history questionnaire. This included questions regarding smoking behavior and a self-health rating. Using the 3DPAR, participants recalled the activity performed for each 30-min block of time for the preceding 3 d (Monday, Sunday, and Saturday). Each day was broken into 34 30-min time periods between 7:00 a.m. and 12:00 p.m. Using the standard 3DPAR protocol (15), any participants who made more than four incompatible responses (e.g., the activity of sleeping and intensity rating of hard) were excluded from the study. In cases where there were incompatible responses in fewer than four occurrences from one participant, the activity was assigned a MET value considered appropriate for that activity. To be included participants had to fully complete all 3 d of the 3DPAR instrument. Moderate-to-vigorous physical activity (MVPA) was defined as the total number of 30-min blocks with a MET rating of at least 3.

TABLE 2. Baseline characteristics of participants.

Individual and Demographic Characteristics	Pedometer (PED) Intervention (N = 23) Mean ± SD	Minutes (MIN) Intervention (N = 21) Mean ± SD	Control (CON) (N = 24) Mean ± SD	F
Age (yr)	15.9 ± 0.8	15.7 ± 0.8	15.9 ± 0.8	0.7
BMI category ($kg \cdot m^{-2}$) (% participants)	22.3 ± 4.1	23.7 ± 6.6	24.5 ± 5.5	1.0
Healthy weight	48	39	50	
Underweight	22	25	12.5	
Overweight	26	10	25	
Obese	4	26	12.5	
Waist circumference (cm)	74.4 ± 9.0	79.1 ± 16.1	77.2 ± 13.6	0.7
Aerobic capacity ($mL \cdot kg^{-1} \cdot min^{-1}$)	46.7 ± 7.5	40.1 ± 8.0	38.3 ± 6.2	7.8*
Total step count for 4 d	30004 ± 3658	24497 ± 5456	33598 ± 5889	17.9**
Total METs for 3 d[a] (3D PAR-determined)	181.2 ± 28.7	174.2 ± 25.9	174.9 ± 23.2	0.6
Total MVPA for 3 d[b] (3DPA R-determined)	13.6 ± 10.7	11.0 ± 7.1	10.4 ± 7.0	1.2
Total VPA for 3 d[c] (3DPAR-determined)	0.8 ± 1.6	1.9 ± 3.7	1.2 ± 2.1	0.2
Smoking status (% participants)				
Never smoked	65	74	65	
Former smoker	17	0	9	
Current smoker	17	26	26	
Blood pressure				
Systolic (mm Hg)	122 ± 13	118 ± 16	121 ± 15	0.5
Diastolic (mm Hg)	74 ± 12	75 ± 13	66 ± 9	3.8***
Overall self-health rating (% participants)				
Good or excellent	74	50	52	

* $P \leq 0.01$; [a] METs, metabolic equivalents; [b] MVPA (moderate-to-vigorous physical activity) was defined as the total number of 30-min blocks where activity had a MET rating of at least 3; [c] VPA (vigorous physical activity) was defined as the total number of 30-min blocks recorded had a MET value of at least 6.
* PED > MIN, PED > CON; ** CON > MIN, CON > PED, PED > MIN; *** CON > MIN.

Vigorous physical activity (VPA) was defined as the total number of 30-min blocks where activity recorded had a MET value of at least 6.

Protocol. Detailed written and verbal instructions regarding the use of the pedometer were given to all study participants. One of the principal instructions to participants was to engage in their normal activities for the period they were wearing the pedometers for measurement purposes. Participant compliance to these instructions was determined through the completion of a daily pedometer diary.

On completion of each measurement period (pre, mid, and post), participants had their pedometer values recorded by the research team. At this time the participants completed the 3DPAR under the guidance of a trained research assistant using standardized procedures. This resulted in 4-d pedometer values that included a Friday from 9:00 a.m. through to the following Tuesday at 9:00 a.m. The 3DPAR was used to record activity on the Saturday, Sunday, and Monday of each measurement period. The research team returned to the school later that week to administer the various physical assessments and have students fill out the demographic and health history questionnaire. The participants were instructed in the appropriate clothing to wear and to have fasted for 3 h before the tests were administered.

Data analysis. All data were analyzed using SPSS for Windows (Version 11.5, SPSS, Inc, Chicago, IL). At baseline, midintervention and postintervention we assessed changes in 4-d step count, 3DPAR-determined MVPA and VPA, and BMI; a two-way split-plot (between factor = 3 × groups; within factor = 3 × time) analysis of variance (ANOVA) was used to determine differences between the control group (CON), pedometer intervention group (PED), and minutes intervention group (MIN). Where significant interactions were found, follow-up simple main effects tests were used. Specifically, for the 4-d step count variable, separate (midintervention, postintervention) two-way ANCOVA (ANCOVA) with baseline step count as covariates were conducted. All *post hoc* tests were performed with adjustment for multiple comparisons. Assumptions of homogeneity of variance and sphericity were checked and not violated. Effect sizes were calculated to assess the magnitude of the intervention effects.

RESULTS

Participant characteristics are outlined in Table 2. The sample was overwhelmingly of European descent and aged 15−18 yr (mean = 15.8 ± 0.8). The percentage of participants classified as overweight or obese was 30.4, 35.6, and 37.5% for the PED, MIN, and CON groups, respectively. At baseline, there were significant differences ($P \leq 0.01$) between all groups on 4-d step count. Estimated aerobic capacity was significantly different among the PED and MIN group ($P \leq 0.01$), and the PED and CON groups ($P \leq 0.01$). There were significant differences at baseline between groups with regard to diastolic blood pressure with the CON group having a significantly higher mean diastolic blood pressure than the MIN group ($P \leq 0.01$). There were no other significant differences at baseline on participant characteristics or variables of interest.

Table 3 represents changes in physical activity variables across the 12-wk intervention for each of the three groups. There were significant group, time, and interaction effects for blinded 4-d step count. Main effects tests for group at week 6, controlling for the difference in blinded 4-d step count between groups at baseline, revealed a significant difference ($F = 3.36$, $P = 0.04$) with an effect size of 0.10 (small). *Post hoc* analyses showed that the difference was between the PED and MIN group ($P = 0.04$). There were no significant differences between the CON and the PED group

TABLE 3. Changes in physical activity variables during 12-wk intervention.

Variable	Pedometer Intervention (N = 23) Mean ± SD	Minutes Intervention (N = 21) Mean ± SD	Control (N = 24) Mean ± SD	Group Time (P)
4-d step count				0.00*
Preintervention	30,004 ± 3,658[a]	24,497 ± 5,456[a]	33,598 ± 5,889	
Midintervention	37,352 ± 7,4581[b]	29,028 ± 6,7891[b]	36,096 ± 9,293	
Postintervention	40,992 ± 11,5361[a,b]	32,939 ± 6,133[a,b]	34,221 ± 8,4341	
Total MVPA for 3 d[c]				0.94
Preintervention	13.1 ± 9.4	9.1 ± 7.0	10.1 ± 7.9	
Midintervention	12.8 ± 8.1	8.1 ± 6.6	7.9 ± 9.7	
Postintervention	14.2 ± 9.4	11.9 ± 9.7	9.7 ± 8.5	
Total VPA for 3 d[d]				0.81
Preintervention	1.4 ± 2.7	1.5 ± 2.8	1.0 ± 1.7	
Midintervention	4.0 ± 2.7	3.7 ± 4.3	2.4 ± 2.5	
Postintervention	2.7 ± 4.3	2.7 ± 5.4	1.2 ± 2.1	

$P < 0.001$. * Significantly different ($P < 0.05$) changes in step count between groups (CON, PED, or MIN). [a] Significantly different ($P < 0.01$) changes in step count between preintervention and postintervention time points within the group (CON, PED, or MIN). [b] Significantly different ($P < 0.01$) changes in step count between midintervention and postintervention time points within the group (CON, PED, or MIN). [c] MVPA (Moderate-to-vigorous physical activity) was defined as the total number of 30-min blocks where activity had a MET rating of at least 3. [d] VPA (Vigorous physical activity) was defined as the total number of 30-min blocks recorded had a MET value of at least 6.

(P = 1.00) or the CON and the MIN group (P = 0.40) at week 6.

Main effects tests by group at week 12, controlling for the difference in blinded 4-d step count between groups at baseline, revealed a significant difference (F = 4.9, P = 0.01) with a small effect size (0.13). *Post hoc* analysis showed that the mean blinded 4-d step count of the PED group was significantly different when compared with the CON group (P = 0.03). There were no significant differences between the CON and MIN groups (P = 1.00) and the PED and MIN groups (P = 0.06).

Main effects tests for time found that the PED group had a significant increase in steps between baseline and week 12 (P = 0.00) and between week 6 and week 12 (P = 0.00), but not between baseline and week 6 (P = 0.11). Using the same procedure, the MIN group showed a significant increase in steps between Baseline and week 12 (P = 0.01), and between week 6 and week 12 (P = 0.00), but not between baseline and week 6 (P = 0.06). There were no significant differences between time points for the CON group (P = 0.23–0.79). The group by time interaction for 4-d step count was significant, indicating that although both the participants in the PED and the MIN groups significantly increased their step count across the 12-wk intervention, the participants in the PED group had a greater increase in their blinded 4-d step count at the midintervention time point.

There was no significant group by time interaction (F = 0.59, P = 0.94) for changes in 3DPAR-determined 30-min blocks of MVPA (refer to Table 3). There were nonsignificant (F = 1.51, P = 0.24) increases in the number of blocks of MVPA between baseline and week 12 for both the PED and MIN groups. Effect sizes were trivial (0.08). Examination of the 3DPAR-determined questionnaires showed that the type of physical activity that the study participants were engaged in was similar between all three groups at all time points. The predominant physical activities undertaken were ambulatory-based and included walking, jogging, aerobics, and netball. Swimming and cycling were rarely undertaken by any participant regardless of group.

Group by time interactions were not significant (F = 0.21, P = 0.81) for 3DPAR-determined 30-min blocks of VPA (refer to Table 3). There were nonsignificant (F = 1.24, P = 0.30) increases in vigorous activity between baseline and week 12 for the MIN and PED groups. Effect sizes were small (0.25)

No pre-, mid-, or postintervention changes are reported in any group for BMI (F = 1.18, P = 0.32) and the time × group interactions were not significant (F = 0.02, P = 0.98). When considering participants classified as overweight or obese at preintervention (N = 22). No pre-, mid-, or postintervention changes are reported in the CON, MIN, or PED groups for BMI (F = 0.64, P = 0.43) and the time × group interactions were not significant (F = 0.24, P = 0.79).

When controlling for the difference in baseline estimated aerobic capacity, no pre-, mid-, or postintervention changes in any group are reported for estimated aerobic capacity (F = 10.12, P = 0.46), and the time × group interactions were not significant (F = 0.79, P = 0.46).

DISCUSSION

The significant differences between the PED and MIN groups at the midintervention time point, coupled with the significant time interaction suggest that daily step count targets facilitated greater increases in accumulated physical activity than time-based prescription. However, because of nonsignificant differences in the MIN and the PED group at the postintervention time point, the PED may not be superior to MIN beyond an initial 6-wk period. This may suggest that interventions of longer duration may be necessary to sustain the effect observed at 6 wk, or that both PED and MIN will elicit similar long-term results in physical activity in adolescent girls. The PED intervention group in this 12-wk study had a mean increase in average daily steps of approximately 2747 steps per day. This is consistent with other pedometer-driven trials in adult populations. For example, the First Step Program, a 16-wk intervention for adults with type 2 diabetes, reported increases of approximately 4230 steps per day (11). Sugiura and colleagues (22) demonstrated increases (based on a 2-yr trial) of approximately 2500 steps per day when using middle-aged women as the participants.

An interesting finding of this study was that there were no significant differences in 3PDAR-determined MVPA or VPA across any groups. This is indicative of the 3DPAR instrument lacking the sensitivity required to detect small changes in habitual youth physical activity. Using a pedometer as a physical activity measurement tool allows for small increases in ambulatory movement to be detected and accumulated throughout the day. At the onset of this study it was speculated that the MIN intervention group may show a greater increase in VPA than the PED group. This was based on the assumption that using a pedometer as a motivational device would encourage increased ubiquitous movement whereas setting time-based "blocks" of activity may be more reinforcing of VPA such as "going for a 30-min jog" or "going to aerobics for 1-h."

It would seem plausible that blocks of activity are easier to recall than incidental ambulatory movement. This may explain why the significant difference (between PED and MIN groups) in the blinded pedometer values was not reflected by differences in 3DPAR-determined MVPA. However, the similar patterns of increased vigorous physical activity seen for both the PED and MIN groups suggests that as a motivational device a pedometer may increase the wearers potential for engaging in both moderate and vigorous physical activity. Future research that seeks the opinions and attitudes of minimally active adolescent girls to pedometer use, with specific reference to moderate and vigorous physical activity would be valuable in further understanding and refining their use as a physical activity promotion tool.

The findings of the present study show no significant changes in BMI across the 12-wk Girls Stepping Out Program. This may be due to the relatively short duration of this intervention and the possibility of a spontaneous increase in energy intake (7) resulting from increased daily movement. Pedometer-intervention studies of similar length in adult populations have also failed to demonstrated a change in BMI (23). However, studies involving longer intervention (>15 wk) have demonstrated significant decreases in BMI and other health benefits such as improvements in glucose tolerance, lipid profiles, and reductions in systolic blood pressure in adults (11,12,22). In the present study, we estimate, based on average step count changes, that the PED group increased their daily energy expenditure by an average of 166 $kcal \cdot d^{-1}$, and the MIN group by 128 $kcal \cdot d^{-1}$. Small daily increases in energy expenditure are not likely to result in weight loss in the short term.

Limitations. There are several limitations to this study. This study was conducted for a relatively short timeframe of 12 wk. It is unclear whether any of the changes outlined would have been sustained following the completion of this study. Additionally, because of nonrandom assignment of individuals to intervention type, the relatively small sample, and the use of primarily white European participants, results should not be generalized to the entire Australian adolescent female population. Randomization at school level was necessary to reduce the chances of cross-contamination. Further, the baseline differences between blood pressure and estimated aerobic capacity could potentially affect the results. The authors accept the known limitations of using BMI as a measure of overweight/obesity, field-based measures of blood pressure, and cardiorespiratory fitness, and the reliance on self-report to determine 30-min bouts of MVPA and VPA.

Finally, the pitfalls associated with physical activity measurement via pedometry are acknowledged, more specifically the use of a pedometer as both a measurement tool and an intervention device with the same participants is highlighted as a potential confounding factor. Therefore in the future, funds permitting, it is suggested that pedometer-driven intervention trials consider the use of alternative, yet sensitive objective means of assessing changes in physical activity.

CONCLUSION

This study provides the first published evidence of the utility of a pedometer-driven noncurriculum high school intervention.

It has been demonstrated that using pedometers and setting daily step count targets has the potential to positively change the physical activity behavior of low-active adolescent girls. The findings are suggestive of enhanced physical activity outcomes, in the short term (first 6 wk) by the pedometer-intervention group when compared with the time-based prescription group. However, these results are inconclusive because of nonsignificant differences between these groups at the postintervention time point. Further investigation using a longer time frame and follow-up is required to enhance our understanding of using pedometers to elicit long-term physical activity behavior change in this population.

Encouraging low-active girls to use a pedometer as a means of increasing their daily ambulatory activity is not the endpoint of successful physical activity health promotion; indeed this would require weekly participation in vigorous physical activity as well. Nevertheless, we believe that pedometers may be a useful progression tool in moving some girls from minimal to moderate daily physical activity.

This study was funded through a merit grant provided by Central Queensland University. The authors would like to thank Cristina Caperchione and Mitch Duncan for their contribution to this research. The results of the present study do not constitute endorsement of pedometers by the authors or ACSM.

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