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The effectiveness of a 'short, sharp, shock' high intensity exercise intervention in 11- and 12-year-old Liverpool schoolgirls

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Objective: Girls are consistently reported as being less physically active than boys, and physical activity declines substantially in adolescence. The aim of this pilot study was to assess the effect of a novel, high intensity dance intervention on various health measures, and determine compliance to the intervention in 11- and 12-year-old schoolgirls. ***Design:*** Sixteen participants (mean age = 11.79 ± 0.3 years, BMI = 22.67kg/m^2) were randomly assigned to either a control or an intervention group. All participants completed baseline and retest measures, including assessments of habitual physical activity (accelerometry), body composition and bone health (DEXA), anthropometrics, cardiorespiratory fitness (VO_{2peak}), and cardiovascular measures (left ventricular mass, carotid intima-media thickness, blood pressure). The intervention group completed a three-week high-intensity dance-based intervention consisting of four sessions of 6 × 30 second bouts of high intensity activity. Intensity was monitored using heart rate. ***Results:*** The mean completed intervention time was 28.1minutes out of a possible 36minutes (78%). The mean % HR max values of 94.2%, 93.7%, and 96.8% were achieved for intervention weeks 1, 2 and 3, respectively. Results described non-significant improvements in body mass, waist and hip circumferences, fat mass, trunk fat, VO_{2peak}, MVPA and step counts in the intervention group. The control group displayed some non-significant increases in measures of adiposity, including body mass, waist circumference, fat mass and trunk fat. ***Conclusion:*** Findings suggest that the intervention had some impact on body mass maintenance and was well tolerated by participants. The intervention warrants further investigation with larger participant groups.

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Key Words: childhood obesity, fitness, physical activity, high-intensity intervention

INTRODUCTION

The prevalence of overweight and obesity has increased substantially while levels of physical fitness have declined in schoolchildren in recent years (1, 2). Therefore, a substantial proportion of children may be at increased risk of developing chronic diseases and disorders associated with excessive adiposity and poor physical fitness. These declines in fitness and increases in excessive adiposity highlight the need for interventions that promote effective weight loss, physical activity and fitness in children. Typically, intervention studies that aim to reduce adiposity in encouraging increases in levels of moderate to children are conducted in clinical settings and target physical activity and/or dietary intake by vigorous physical activity (MVPA), increased intake of fruit and vegetables, and reduced intake of fatty foods. Unfortunately, these studies often show little or no meaningful success (3).

Despite recommendations suggesting that to promote health children should accrue 60 minutes of MVPA daily (4), some studies describe greater improvements in health markers and fitness using high intensity interventions independent of age, maturation and gender (5). One intervention study conducted over a

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period of eight months with obese 13- to 16-year-old adolescents assessed the impact of lifestyle education, lifestyle education plus moderate intensity training, and lifestyle education plus high-intensity training interventions on levels of body fat (%BF), cardiovascular fitness, and visceral adipose tissue (6). Training groups displayed a significant increase in aerobic fitness, with greater increases in fitness observed in the high-intensity group. Combined training group data described significant improvements in visceral fat, fitness, %BF and bone mineral density in comparison to the education only group (6). Changes in body composition did not differ significantly between the moderate- and high-intensity groups, but the high-intensity activity was more effective in improving the cardiorespiratory fitness of participants (6). In addition, individuals that showed the greatest improvements in cardiovascular fitness also showed the largest improvements in visceral adipose tissue and %BF (6). A review of aerobic trainability in youth stated that aerobic training tended to lead to a mean improvement in VO_{2peak} of approximately 5-6% independent of training frequency, programme length, gender, pubertal status and programme duration (7). Moreover, the authors highlighted the importance of training intensity, suggesting that an intensity of >80%HR_{max} would be required to elicit meaningful increases in VO_{2peak} (7). Taking the review article and the work of Gutin and colleagues (2002) into account, it would seem that high intensity interventions may provide a greater likelihood of changes in physical fitness and body composition than traditional moderate activity interventions. Other studies describe larger improvements in fitness and health markers using high intensity interventions independent of age, maturation and gender (5).

Further evidence suggests that high intensity exercise interventions may result in metabolic changes in short periods of time. One study conducted in recreationally active adults assessed the impact of two weeks of sprint interval cycle training on oxidative potential, VO_{2peak} and endurance time to fatigue (8). The training resulted in increased cycle endurance capacity (doubled endurance time to fatigue during cycling at 80% VO_{2peak}); lowered RER values at retest, although there were no significant changes in VO_{2peak}; and increased muscle oxidative potential (maximal activity of citrate synthase increased 38% and resting muscle glycogen increased by 26%) (8). The high intensity intervention resulted in some significant metabolic changes in active adults in a very short time.

The impact of a high intensity, ‘short, sharp’ intervention on sedentary adults is relatively unknown. The impact of a high intensity intervention on relatively sedentary, overweight children remains untested despite other evidence describing some impact of high intensity training on markers of adiposity and fitness in children (6). Girls are consistently reported as being less active than boys (9-11). In addition, levels of physical activity decline dramatically as girls enter adolescence (12). Therefore, early intervention is urged, where girls may benefit from being targeted separately from boys and interventions can be focussed towards girls’ preferred modes of physical activity. For example, one Canadian study found that girls participated more often than boys in activities such as dance, aerobics and skipping, as opposed to traditional sporting activities such as football (13). Other evidence suggested that girls prefer physical activities that are ‘fun’, co-operative and non-competitive, again including activities such as aerobics and dance (14). Furthermore, the promotion of ‘fun’ in intervention sessions may boost satisfaction, a key socio-cognitive process that has been previously linked to physical activity in adolescent girls (15). Additional evidence highlighted the importance of the enjoyment of physical activity in encouraging participation in physical activity and sport in adolescent girls (16). There seems a requirement, therefore, to develop effective physical activity interventions for girls that emphasize fun and participation rather than sporting excellence or competition. Furthermore, one study conducted in the USA that assessed factors associated with changes in physical activity in adolescent girls described time constraints as one of the strongest and most consistent factors associated with changes in physical activity participation (17). Therefore, a time-efficient intervention may result in higher compliance than a traditional higher volume intervention study. Marrying a tailored intervention for girls with a high intensity, time-efficient approach may offer a better opportunity to improve health markers (including body composition, fitness and cardiovascular measures) and disease risk.

The aim of this pilot study was to assess the effect of a school-based ‘short, sharp, shock’ high intensity exercise intervention for overweight 11- and 12-year-old schoolgirls on various measures of cardiovascular health, body composition, bone health, aerobic fitness and physical activity, and levels of compliance to the intervention. Girls were chosen to participate in this study as they are consistently reported to be less active than boys and would benefit from intervention. Furthermore, girls’ preferences for physical activity suit a tailored, novel approach to promoting physical activity.

MATERIAL AND METHODS

After institutional ethical approval was granted, parental consent and child assent obtained, Sixteen Liverpool schoolgirls (mean age = 11.79 ± 0.3 years,

Table 1. Mean age, anthropometrics, and maturity for the intervention and control group at baseline and retest

Measure	Intervention Group			Control Group		
	Baseline	Retest	Difference	Baseline	Retest	Difference
Age (years)	11.72 ± 0.28	11.78 ± 0.27	0.06	11.79 ± 0.33	11.87 ± 0.33	0.08
Maturation (years)	0.187 ± 0.37	0.187 ± 0.37	0	0.028 ± 0.427	0.028 ± 0.427	0
BMI (kg/m²)	24.3 ± 2.5	23.8 ± 2.2	- 0.5	21.1 ± 3.1	21.3 ± 3.1	0.2
Body Mass (kg)	57.7 ± 7.5	57.0 ± 7.0	- 0.7	49.8 ± 8.4	50.6 ± 8.3	0.8
Stature (cm)	154.0 ± 4.7	154.4 ± 4.9	0.4	153.7 ± 5.9	154.2 ± 5.7	0.5
Triceps Skinfold (mm)	10 ± 8.5	12 ± 7.7	2.0	12 ± 8.7	12 ± 6.3	0
Subscapular Skinfold (mm)	12 ± 7.6	11 ± 7.4	-1.0	15 ± 9.9	13 ± 5.6	-2.0
Suprailiac Skinfold (mm)	12 ± 6.2	11 ± 7.2	-1.0	13 ± 8.7	11 ± 5.2	-2.0
Waist Circumference (cm)	77.8 ± 6.7	77.3 ± 6.9	-0.5	71.1 ± 8.9	71.6 ± 7.7	0.5
Hip Circumference (cm)	88.9 ± 7.4	86.5 ± 6.6	-2.4	80.3 ± 7.0	80.1 ± 7.0	-0.2
Waist:Hip	0.87 ± 0.02	0.89 ± 0.03	0.02	0.89 ± 0.03	0.89 ± 0.05	0

mean BMI = 22.67 kg/m^2) participated in this pilot study. The schoolgirls were in Year 7 at secondary school. This age group was selected for practical reasons -for example, secondary school-aged children would have the necessary skills to complete the dance-based intervention and arrive at the intervention sessions independently (i.e., without teachers leading them to the intervention venue). Also, as physical activity declines with age and is lowest in girls, the participants represented a population that may benefit from a physical activity intervention. To boost attendance, a £5 gift voucher was offered as an incentive to all participants. Participants were randomly assigned to an experimental (n=8) or control group (n=8) by picking names out of a hat. All participants attended the laboratories for baseline and retest measures. Intervention sessions were delivered in the dance studio at a local secondary school.

Laboratory Measures

Stature, sitting stature (Holtain limited, Crymech, UK) and body mass were measured to the nearest 0.01m and 0.1kg (Seca, Bodycare, Birmingham). Maturity was estimated according to the offset technique proposed by Mirwald and colleagues (18).
A negative value for maturity offset represented a participant that had yet to reach peak height velocity. For example, -1.0 would represent a participant that was expected to reach peak height velocity in one year from the measurement date. Conversely, a positive value for maturity offset represented a child that had past the point of peak height velocity.
Skinfolds (triceps, subscapular and suprailiac) were measured in triplicate and means were taken (Harpenden, Cranlea, Birmingham). Waist and hip circumferences were estimated using a tape measure. Anthropometric assessments were conducted by one researcher throughout.

Whole body scans were performed using fan mode dual X-ray absorptiometry (DEXA Hologic QDR series, Delphi A, Bedford, Massachusetts). Fat mass index and fat free mass indexes were calculated by dividing fat mass or fat free mass by height (m) squared. One researcher conducted DEXA assessments throughout the study, assisted by two additional researchers when positioning participants.
Echocardiographic images (Esoate Mylab 300V, Italy) of the left ventricle were taken in the long axis from the parasternal window. The resultant LV mass values were then indexed for height (LVM/Height2.7). One researcher completed all echocardiographic assessments in the study. Carotid intima-media thickness images were taken from the participants' left and right common carotid arteries, with the clearest two scans (one from the left side and one from the right side) retained for analysis. One researcher conducted all CIMT assessments throughout the study.
A discontinuous treadmill protocol was used to measure VO_{2peak} using online gas analysis equipment (Oxycon Pro, Wuerzburg, Germany). Participants completed a warm-up period during which participants were fully familiarised with procedures and equipment. Participants wore a heart rate monitor throughout the protocol. Starting speed was set at 5 km•h^{-1}. The protocol systematically increased in intensity by increasing speed by 2 km•h^{-1}.
Incline was maintained at 1% throughout. This was adapted to suit the individual and to ensure that end points of exercise were met (heart rate above 200 beats·min^{-1}, or RER value of 1.05).
Habitual physical activity was measured using a uniaxial accelerometer (ActiGraph, Model 7164, MTI Health Services, FL, USA). Monitors were distributed to participants and worn on the right hip for five consecutive days using a 5-second epoch. Moderate to vigorous activity was defined using specific paediatric cutoff points, whereby 100+ counts per 5-second epoch represented moderate to vigorous physical activity for 11.5-year-olds (19).

Table 2. Mean body composition, bone measures, cardiovascular measures, aerobic fitness, physical activity and steps: intervention and control group at baseline and retest

Measure	Intervention Group			Control Group		
	Baseline	Retest	Difference	Baseline	Retest	Difference
***Fat Mass** (kg)*	23.87 ± 6.7	23.65 ± 7.0	-0.22	18.0 ± 6.52	18.55 ± 6.59	0.55
***Fat Mass Index** (kg/m²)*	10.03 ± 2.65	9.89 ± 2.77	-0.14	7.62 ± 2.64	7.81 ± 2.67	0.19
***Percent Body Fat** (%)*	40.34 ± 7.25	40.56 ± 8.18	0.22	34.99 ± 8.94	35.45 ± 8.7	0.46
***Fat Free Mass** (kg)*	32.84 ± 3.43	32.16 ± 3.46	-0.68	30.63 ± 4.34	30.96 ± 4.15	0.33
***Fat Free Mass Index** (kg/m²)*	13.82 ± 1.1	13.51 ± 1.29	-0.31	12.95 ± 1.54	12.99 ± 1.34	0.04
***BMC** (kg)*	1.7 ± 0.18	1.7 ± 0.22	0.00	1.66 ± 0.23	1.68 ± 0.22	0.02
***BMD** (g/cm²)*	0.79 ± 0.042	0.793 ± 0.043	0.003	0.822 ± 0.052	0.830± 0.056	0.008
***Trunk Fat** (kg)*	10.53 ± 3.75	10.34 ± 4.0	-0.19	7.37 ± 3.33	7.47 ± 3.21	0.1
***CIMT** (mm)*	0.39 ± 0.03	0.39 ± 0.01	0.00	0.42 ± 0.05	0.41 ± 0.04	-0.01
***LV Mass/Height** $^{2.7}$ ($g/m^{2.7}$)*	65.32 ± 8.83	64.95 ± 10.08	-0.37	65.36 ± 9.68	60.53 ± 8.51	-4.83
***Systolic BP** (mmHg)*	102.3 ± 9.9	112.4 ± 4.1	10.1	110.7 ± 12.1	109.3 ± 12.1	-1.4
***Diastolic BP** (mmHg)*	58.7 ± 5.0	64.6 ± 4.9	5.9	62.9 ± 7.3	58.8 ± 5.3	-4.1
VO_{2peak} ($ml.kg^{-1}.min^{-1}$)	41.26 ± 4.67	42.59 ± 7.51	1.33	43.61 ± 9.01	45.71 ± 7.09	2.1
***Average MVPA** (mins per day)*	82.16 ± 13.89	85.13 ± 25.79	2.97	* 109.4 ± 11.51	*	*
***Average Steps** (steps per day)*	8900.91 ± 1546.02	9334.25 ± 2784.12	433.34	* 11611.49 ± 1350.0	*	*

* Only 3 participants met the minimum inclusion criteria at retest.

The minimum wearing time was defined as 10 hours per day. At least two days of data was used for each participant to meet the minimum inclusion criteria. The mean time spent in MVPA each day was calculated for each participant. Mean step counts were also included as derived from the raw accelerometry data. All measures were taken at baseline and at retest after the exercise intervention.

High Intensity Dance-Based Intervention Design

The study was completed over five weeks. In week 1, participants attended the laboratories for baseline testing. The intervention was completed in weeks 2-4, leaving week 5 for post intervention measures. The intervention consisted of four sessions per week, and took place in morning form time: 8.30-8.50 am in the school's dance studio. In each session, participants completed a high intensity exercise programme loosely based on dance. The sessions consisted of a comprehensive warm-up followed by six 30-second bouts of high intensity activity, with 45-second rest periods between activity bouts. Basic aerobics/dance moves were used and adjusted according to participant feedback during sessions. A thorough cool-down consisting of light jogging, walking and stretching was completed before participants left the dance studio. Throughout all intervention sessions, participants wore Polar Team System heart rate monitors that monitored HR every five seconds (Polar Electro, Oy, Kempele, Finland), allowing investigators to monitor intensity of activity for each session. Participants were assigned a HR monitor at intervention session 1 and used the same monitor throughout the project. HR data were recorded every five seconds throughout intervention sessions and downloaded to a laptop PC. Peak HRs attained in each intervention session as a percentage of HR maximum were assessed after each session to ensure that exercise intensity was suitably high. The maximum exercise time for the three-week intervention was 36 minutes. Participants were encouraged to complete the full programme.

Factorial analysis of variance was used to assess differences between baseline and retest data and to compare the control and intervention groups. An alpha value of $p \leq 0.05$ was used to detect any significant differences.

RESULTS

Table 1 displays the mean ± SD values for age, BMI, stature, body mass, skinfold values, waist circumference, hip circumference and waist:hip ratio for the intervention and control groups at baseline and retest. The table also shows the differences between baseline and retest measures for both groups.

Table 2 displays the mean ± SD values for body composition, BMC, BMD, cardiovascular measures, and VO_{2peak} for the intervention and control groups at baseline and retest, and the differences between baseline and retest values. The table also displays MVPA and step counts for the intervention group at test and retest, and the control group at baseline. The MVPA retest data for the control group were omitted as only three of the participants reached the minimum inclusion criteria. The range of values for the three included participants were MVPA range: 70.21 – 96.08 minutes per day, and step counts range: 7059-9009 steps per day.

The results of the factorial ANOVAs found that the intervention group had significantly higher body mass, BMI, waist circumference, hip circumference, fat mass, FMI, and trunk fat in comparison to the control group at baseline ($p \leq 0.05$). There were no significant differences between baseline and retest values with the exception of an increase in diastolic blood pressure in the intervention group. As control group physical activity data were only available for three participants analysis of variance was completed between baseline and retest data for the intervention group only. There were no significant differences in the time spent in MVPA or average number of steps per day between baseline and retest for the intervention group ($p>0.05$).

In terms of compliance to the intervention, one participant (age= 12.1 years, BMI = 27.5 kg/m2) withdrew from the study after intervention session three. After omitting the data from this participant, the mean exercise time for the seven remaining participants was 28.1 minutes out of a possible 36 minutes (78%). Mean peak % HR maximum values of 94.2%, 93.7%, and 96.8% were achieved for intervention weeks 1, 2 and 3 respectively, suggesting that high intensity exercise was maintained throughout the intervention.

DISCUSSION

The aim of this pilot study was to assess the compliance to and effect of a school-based ‘short, sharp, shock’ high intensity exercise intervention on various health measurments in 11- and 12-year-old school girls. Results described non-significant improvements in body mass, subscapular and suprailiac skinfold thicknesses, waist and hip circumferences, fat mass, trunk fat, VO_{2peak}, MVPA and step counts in the intervention group. The control group displayed some non-significant increases in measures of adiposity, including body mass, waist circumference, fat mass and trunk fat. These findings suggest that the intervention may have had some positive impact on body mass maintenance, reducing body mass gain over the study period; however, there were no significant differences between baseline and retest measures with the exception of an increase in diastolic blood pressure in the intervention group.

Previous research has described improvements in body composition and physical fitness using high intensity interventions (6), although improvements in body composition were similar between high- and moderate-intensity intervention groups. Gutin et al.’s (2002) work described the greatest improvements in body composition in participants that showed the largest improvements in aerobic fitness. The greatest improvements in fitness were observed in the high-intensity training group (6). Furthermore, some studies described greater improvements in health markers and fitness using high intensity interventions independent of age, maturation and gender (5). In the pilot study, the differences observed between the groups suggest that the high intensity intervention may have had some non-significant impact on various markers. However, because of the low number of participants and because the control and intervention groups were not matched at baseline (the intervention group were fatter), it is unclear whether these differences were meaningful or attributable to the intervention, and warrants further investigation.

Compliance to the intervention was high, with mean completed exercise time at 78% (28.1 minutes) of total exercise time. As girls reportedly prefer non-competitive, co-operative, fun-filled, enjoyable activities such as dance and aerobics (13, 14, 16), the intervention targeted this type of activity. Moreover, as time constraints are theorised to impact girls’ participation in physical activity (17), the relatively time-efficient intervention in combination with its targeted nature may have aided in boosting compliance, and may represent an effective method for future intervention studies involving girls.

One common criticism of obesity intervention studies is the environment in which they are completed, often taking place in clinical settings (3). The school-based intervention sessions timetabled into morning form/registration time were well attended. Similar periods in the school day may provide other opportunities for interventions.

Physical activity data showed no significant differences from baseline to retest in the intervention group, which may be due in part to poor physical activity data and the low number of participants. Physical activity monitoring proved highly problematic in the study. Participants were reluctant to wear the monitors for the required duration each day, and for the optimum number of days. This resulted in a number of datasets being omitted from analysis because they failed to meet the minimum inclusion criteria of 2 × 10 hours. Participants typically disliked the appearance of the monitor and felt that wearing it set the participant apart from classmates and other peers. Therefore, future studies may aim to boost compliance by providing more information, or by monitoring whole classes to reassure intervention participants that they do not ‘stand out’ from their classmates. In addition, future studies may include some qualitative measures to improve our understanding of physical activity and factors that influence compliance when attempting to monitor physical activity in children.

No significant improvements in VO_{2peak} were observed in the intervention group. This may be due to the short nature of the intervention. The lack of an improvement in VO_{2peak} in the intervention group may also be due to the theorised biological threshold before which no improvements in cardiorespiratory fitness can be achieved in childhood (7). Furthermore, the relationship between physical activity and fitness in children is unclear, and several studies have described little or no relationship between the variables (20, 21). However, the high intensity exercise intervention in recreational cyclists mentioned previously in this study also showed no improvements in VO_{2peak}, but did show improvements in metabolic measures and endurance time to fatigue (8). Other evidence shows performance improvements (time trials) and metabolic changes comparable with traditional high volume endurance training in recreational cyclists using a high-intensity training programme (22).

More detailed information about the effectiveness of the intervention could have been extracted from biochemical analysis, as metabolic changes may become apparent prior to any significant changes in body composition, fitness or non-invasive cardiovascular measures. Furthermore, an endurance time to fatigue measure or time trial measure may have described some improvements in performance, although the focus of this study was the effect of the intervention on health markers rather than performance outcomes.

Previous studies have investigated metabolic markers in children where evidence describes links between lipid profiles, aerobic fitness and body composition in children (23, 24). One study assessed the impact of an eight-week training intervention on fasting insulin, subclinical inflammation (CRP, lipids), and endothelial function in overweight children and adolescents (mean age 10.9 years) (23). After the eight-week intervention, significant improvements in VO_{2peak}, HDL levels, and flow-mediated dilation were observed in the exercise group (23), suggesting that improvements in lipid profiles and endothelial function can be observed after an eight-week intervention. The inclusion of similar measures in the present study may have provided more insight into the impact of the intervention on metabolic and vascular markers. Furthermore, this pilot study used a novel intervention design and the influence of such an intervention on cardiovascular markers in children was previously relatively unknown. Future studies in children should aim to assess metabolic changes as health markers rather than using measures such as LV mass and CIMT, although participant recruitment to studies where venous blood samples are required may prove problematic.

One major criticism of obesity interventions is their insufficient duration (3). Typically, obesity interventions are moderate to vigorous physical activity interventions. The focus of the present study was to assess a 'short, sharp, shock' intervention that required a relatively low time commitment and to assess the impact of this type of intervention on overweight schoolgirls. Despite the short nature of the intervention, results show some positive impact on various markers, but the lack of significant improvement suggests that the intervention may have lacked participant numbers, been of insufficient duration or that outcome measures were unsuitable for detecting intervention effects.

Another limitation of the study was a lack of dietary information. The lack of data on dietary habits and intake leaves an important contributing factor to overweight and obesity unexplored. As assessments of dietary habits are fraught with methodological drawbacks and other challenges (25, 26), the development of an accurate method of assessing food intake in children is required to provide reliable and valid data in similar studies. In addition, a similar study that includes some element of dietary intervention may provide more substantial changes in measures over the five-week period.

The major limitation of the present study was the lack of participant numbers, resulting in the study being underpowered. This makes it difficult to accurately assess the impact of the intervention on the participants or to extrapolate findings to a wider population. As a result, it remains unknown whether this type of intervention represents a suitable or effective method to use in overweight 11- and 12-year-old schoolgirls, and therefore requires further investigation. Future studies should include higher numbers of participants (using an a priori power calculation based on an effect size of 0.5, 27 participants would be required to achieve a statistical power of 0.8) to allow the effectiveness of the intervention to be fully investigated.

In conclusion, the 'short, sharp, shock' intervention appeared to have some positive effect on body composition, including reductions in fat mass, trunk fat, body mass and some minor changes in aerobic fitness and step counts. However, these changes were non-significant. Moreover, the control group showed some non-significant increases in markers of adiposity, suggesting that the intervention had an impact on body mass maintenance that warrants further investigation. Future studies should investigate the clinical significance of minor changes, and the persistence of body mass maintenance.

To improve the likelihood of observing some statistically significant changes, higher numbers of participants with better compliance—particularly when monitoring habitual physical activity—would be required. The duration of the intervention period mayalso need to be increased. It also seems worthwhile to include some additional measures in future research, such as lipid profiling, which may be more sensitive to changes than the measures used in this study.

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