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Preventing Obesity among Adolescent Girls: One Year Outcomes of the Nutrition and Enjoyable Activity for Teen Girls Cluster Randomized Controlled Trial

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Abstract

Objective: To evaluate the impact of a 12-month multi-component school-based obesity prevention program (NEAT Girls [Nutrition and Enjoyable Activity for Teen Girls]) among adolescent girls.

Design: Group randomized controlled trial with 12-month follow-up.

Setting: Twelve secondary schools in low-income communities in the Hunter and Central Coast regions of New South Wales, Australia.

Participants: Adolescent girls aged 12 to 14 years (N = 357).

Intervention: A multi-component school-based intervention tailored for adolescent girls. The intervention was based on Social Cognitive Theory and included teacher professional development, enhanced school sport sessions, interactive seminars, nutrition workshops, lunch-time physical activity sessions, handbooks and pedometers for self-monitoring, parent newsletters, and text messaging for social support.

Outcome Measures: Body mass index (BMI), BMI z-score, percentage body fat, physical activity, screen time, dietary intake and self-esteem.

Results: After 12 months, changes in BMI (adjusted mean difference [95% CI] = -0.19, [-0.70 to 0.33], $p = 0.44$), BMI z-score (-0.08 [-0.20 to 0.04], $p = 0.17$), and percentage body fat (-1.09 [-2.88 to 0.70], $p = 0.20$) were in favor of the intervention, but were not statistically significant. Changes in screen time were statistically significant (-30.67, [-62.43 to -1.06], $p = 0.024$), but there were no group by time effects for the other secondary outcomes.

Conclusions: A school-based intervention tailored for adolescent girls from schools located in low-income communities did not significantly reduce BMI gain. However, changes in body composition were of a magnitude similar to previous studies and may be associated with clinically important health outcomes.

Trial Registration: Australian New Zealand Clinical Trials Registry No:

ACTRN12610000330044

The prevalence of child and adolescent obesity has increased considerably over the past 30 years and current estimates suggest that approximately a quarter of youth in developed nations are overweight or obese^{1,2}. Although there is evidence to suggest that levels of pediatric and adolescent obesity have plateaued in recent years³, this trend has not been observed among youth of low socio-economic position (SEP)^{4,5}. Obesity prevention is a global health priority⁶ because pediatric weight status is associated with a range of adverse health outcomes⁷ and obese youth are at an elevated risk for obesity in adulthood⁸.

Schools have been identified as important institutions for the prevention of obesity⁹, but evidence for the long-term effects of school-based obesity prevention programs are extremely limited¹⁰. Of the few studies that have included assessment periods of 12 months or longer, the results have been modest and significant improvements in BMI are rarely found^{9,11}. Recent high quality studies have demonstrated that school-based interventions have the potential to improve body composition among youth of low SEP¹²⁻¹⁴. The Dutch Obesity Intervention in Teenagers (DOiT) resulted in small (i.e. -2mm) but statistically significant changes in body fat in girls after 20 months¹³. Similarly, significant reductions in boys' and girls' BMI z-score (i.e. -0.05) were found in the large-scale HEALTHY intervention after three years¹². The physical activity decline associated with adolescence is steeper among girls¹⁵ and unhealthy weight gain is often observed in this cohort^{16,17}. Consequently, the importance of tailoring obesity prevention programs for pre-adolescent and adolescent girls has emerged in the literature¹⁸⁻²⁰.

Therefore, the aim of the current study was to evaluate the effects of the Nutrition and Enjoyable Activity for Teen Girls (NEAT Girls) program²¹. NEAT Girls was a 12-month school-based group randomized controlled trial (RCT) designed to prevent unhealthy weight gain in adolescent girls of low SEP. The development of the NEAT Girls intervention was guided by Bandura's Social Cognitive Theory (SCT)²² and included a range of strategies designed to increase physical activity and healthy eating and reduce screen time. This article reports the 12-month intervention effects.

METHODS

STUDY DESIGN AND PARTICIPANTS

Ethics approval for the study was obtained from the University of Newcastle, Australia and the New South Wales (NSW) Department of Education and Training Human Research Ethics Committees. School Principals, parents and study participants provided written informed consent. The design, methods and characteristics of participants at baseline have been reported in detail elsewhere²³. In summary, NEAT Girls was a group RCT, the design, conduct and reporting of the trial adhere to the Consolidated Standards of Reporting Trials guidelines²⁴. Baseline assessments were conducted in May/June 2010 and 12-month (immediate posttest) assessments were completed in May/June 2011.

The intervention was designed for adolescents from schools located in low-income communities and the Socio-Economic Indexes for Areas (SEIFA) index of relative socioeconomic disadvantage was used to identify eligible secondary schools. The SEIFA index (scale 1 = lowest to 10 = highest) summarizes the characteristics of people and households within an area. State funded government secondary schools located in the Hunter Region and Central Coast areas in NSW with a SEIFA index of ≤ 5 (bottom 50%) were considered eligible for inclusion. Twelve secondary schools were recruited and eligible study participants were adolescent girls in Grade 8 (2nd year of secondary school).

SAMPLE SIZE CALCULATION AND RANDOMIZATION

The sample size calculation was based on change in body mass index (BMI), which is the preferred outcome for obesity prevention studies in youth²⁵. Assuming an α of 0.05, power of 80% and a 20% drop-out, we calculated that we would require 30 participants from each of the 12 schools to detect a between group difference of 1kgm^{-2} ²⁶, using a BMI standard deviation of 1.5kgm^{-2} ¹³ and an intraclass correlation coefficient (ICC) of 0.01²⁷. Following baseline assessments, the 12 schools were match paired (i.e., 6 pairs of schools) based on their

geographical location, size and demographics²⁸. An independent researcher then randomized each pair to either the NEAT Girls intervention or the control group.

INTERVENTION

The NEAT Girls intervention was informed by the Program X pilot study^{29, 30} and a detailed description of the intervention has been reported previously²³. The intervention was guided by Bandura's SCT²² and targeted evidence-based psychological (i.e., self-efficacy, outcome expectations, outcome expectancies), behavioral (i.e., goal setting and self-monitoring) and environmental (i.e., teacher, family and peer support) mediators of physical activity and nutrition behavior change^{31, 32}. The intervention included the following components: enhanced school sport sessions, interactive seminars, nutrition workshops, lunch-time physical activity sessions, handbooks and pedometers for self-monitoring, parent newsletters, and text messaging for social support. To facilitate the implementation of the NEAT Girls program, school champions (i.e., teachers responsible for the delivery of the program) from the intervention schools attended a one-day training workshop at the local university. The intervention was focused on the promotion of lifetime physical activities, reducing sedentary behaviors and low-cost healthy eating and was delivered over four school terms (i.e., 12 months) at no cost to the school or students. All intervention schools were provided with a standard equipment pack (value = \$US1300), which consisted of a range of equipment (e.g. elastic tubing resistance training devices, fit balls, yoga and Pilates resources) designed to support the promotion of lifetime physical activities that appeal to adolescent girls, and healthy eating in the school setting.

NEAT Girls was based on well-defined messages designed to promote physical activity and healthy eating and reduce sedentary behavior²³, which were reinforced using the intervention components. The enhanced school sport sessions (60-80 minutes) were delivered by teachers and involved a range of activities organized into 4-week units. For the first school term, the enhanced school sport sessions included an information component (10-15 minutes) delivered by teachers from the study schools. Members of the research team delivered three interactive seminars

focused on the benefits of physical activity and healthy eating and the key behavioral messages. Participants were provided pedometers³³ and handbooks and were encouraged to use these resources to self-monitor their lifestyle physical activity.

Three practical nutrition workshops were delivered in the study schools by Accredited Practising Dietitians. The sessions were designed to provide students with the confidence to select, prepare and consume healthy, low cost foods. Parents of participants were sent study newsletters at four time periods over the 12-month intervention. The first newsletter reported their child's time spent in physical activity, sedentary behaviors, and self-reported fruit and vegetable consumption. All of the newsletters included information to raise awareness and encourage parents to support their children's physical activity and dietary behaviors. To reinforce the targeted behaviors, the girls were sent text messages weekly during the second/third term and bi-weekly during the fourth term of the program's delivery.

To assist in the recruitment of schools and to prevent resentful demoralization or compensatory rivalry²⁸, the control group will be provided with equipment packs and a condensed version of the intervention following the completion of 24-month assessments.

ASSESSMENTS AND MEASURES

Data collection took place in the study schools and was conducted by trained research assistants blinded to group allocation at baseline only.

Primary Outcome Measures

BMI was the primary outcome and was calculated using the standard equation (weight[kg]/height[m]²). Weight was measured in light clothing without shoes using a portable digital scale (Model no. UC-321PC, A&D Company Ltd, Tokyo Japan) and height was measured using a portable stadiometer (Model no. PE087, Mentone Educational Centre, Australia) and BMI-z scores were calculated³⁴. Percentage body fat was determined using the

Imp™ SFB7 bioelectrical impedance analyzer, which is a multi-frequency, tetra polar bioelectrical impedance spectroscopy device with good test-retest reliability in adolescents³⁵.

Secondary Outcome Measures

A modified version of the 90° push-up test (90PU) was used as a measure of upper body muscular endurance³⁶. The prone support test was used to provide a measure of core abdominal isometric muscular endurance. Participants wore Actigraph accelerometers (MTI models 7164, GT1M and GT3X)³⁷ for seven consecutive days to provide a measure of physical activity. Trained research assistants fitted the monitors and explained the monitoring procedures to participants³⁸. Participant data were included in the analyses if accelerometers were worn for ≥ 600 minutes on ≥ 4 days (including one weekend day)³⁹. Data were collected and stored in 30-second epochs and mean activity counts per minute were calculated. Age- and sex-specific cut-points were used to categorize physical activity into moderate and vigorous intensity activity⁴⁰. Dietary intake was assessed using the previously validated Australian Eating Survey (AES) food frequency questionnaire⁴¹. The Adolescent Sedentary Activity Questionnaire was used to provide a self-report of screen time (i.e., watching television/videos/DVDs, computers, e-games and e-communication)⁴². Participants completed selected scales from Marsh's Physical Self Description Questionnaire⁴³.

Process evaluation

A detailed process evaluation was conducted and included attendance/reach (i.e., attendance at enhanced school sport, lunch-time physical activities and nutrition workshops, percentage of students who provided postal addresses and mobile phone numbers and were sent all four newsletters and the 58 text messages), intervention fidelity (i.e., 24 randomly selected sessions were observed by a member of the research team), and program satisfaction (i.e., girls completed detailed process evaluation questionnaires at the completion of the study). Although the enhanced school sport sessions were designed to be flexible in delivery, the fidelity of each

session was assessed using the following criteria (rated, yes = 1, no = 0): i) Was there $\geq 60\%$ student attendance at the session? ii) Was the session delivered by the school champion? iii) Did the school champion deliver the session using the program handbook? iii) Did the session follow the basic structure outlined in the handbook?

STATISTICAL ANALYSIS

Differences between groups at baseline were examined using chi squares and independent samples t-tests in PASW Statistics 17 (SPSS Inc. Chicago, IL) software and alpha levels were set at $p < .05$. Statistical analyses were conducted using mixed models which have the advantage of being robust to the biases of missing⁴⁴. The models were specified to adjust for the clustered nature of the data and the analysis conducted using established models²⁸. The mixed models were analyzed using the PROC MIXED statement in SAS V9.1 (SAS Institute Inc Cary NC).

RESULTS

School and participant recruitment, enrollment and flow are provided in Figure 1. Twelve schools were recruited and 357 participants were assessed at baseline, representing 99.2% of the targeted sample size (Table 1). There were no statistically significant differences between intervention and control groups for any of the outcomes at baseline. Sixty-three girls were unavailable for 12-month assessments; 153 (85.5%) and 141 (79.2%) girls were retained in the control and intervention groups, respectively. The girls who dropped out of the study had higher BMI (mean [SD], 23.81 [4.52] versus 22.39 [4.56], $p = 0.0250$) and BMI z-score (1.11 [1.06] versus 0.73 [1.15], $p = 0.019$) values than study completers.

PRIMARY AND SECONDARY OUTCOMES

Outcomes are reported in Table 2. Changes in body composition were all in favor of the intervention group, but there were no statistically significant between group differences in BMI (primary outcome), BMI z-score or percentage body fat. Girls in the intervention group reported

significantly less screen time than girls in the control group (-30.67, [-62.43 to -1.06], $p = 0.024$). Compliance with our accelerometer monitoring was poor (i.e. 191 and 89 participants wore accelerometers for ≥ 600 minutes on ≥ 4 days including a weekend day at baseline and posttest) and there were no differences between groups on any of the physical activity outcomes. Muscular fitness, dietary intake, physical self-perceptions and self-esteem remained relatively stable over the study period for both intervention and control girls.

INTERVENTION IMPLEMENTATION AND PROCESS OUTCOMES

A total of 148 girls received the intervention. Students' mean (SD) attendance at school sport sessions was 60.6 (26.0)%. On average, girls attended 65.0 (25.1)% of the nutrition workshops, 24.6 (28.1)% of the optional lunch-time sessions, and completed 8.8 (25.7)% of the physical activity and nutrition home challenges. Intervention delivery fidelity was found to be 74.0%. All four of the parental newsletters were sent to valid addresses for 74.5% of girls in the intervention group. A total of 58 text messages were sent to 91% of girls in the intervention group. Overall, girls were satisfied with the program (mean [SD] 3.52 [1.24], 1 = *Strongly disagree* to 5 = *Strong agree*) and the four school sport activities that were rated most favorably were: i) fit balls, ii) boxing for fitness, iii) jump rope and iv) yoga. The enhanced school sport sessions (41.7%) and the nutrition workshops (38.7%) were the two intervention components enjoyed most by girls. Girls were asked to identify which of the 10 behavioral messages were most important to them. The top four messages were: i) *Be active any way that you can*, ii) *Eat more fruit and vegetables* iii) *Eat a healthy breakfast everyday*, and iv) *Reduce your sitting time*. No injuries or adverse effects were reported during the activity sessions or assessments.

COMMENT

NEAT Girls was a multi-component school-based obesity prevention program targeting adolescent girls from secondary schools located in low-income communities. The intervention effects on body composition were small and not statistically significant, but have potential clinical importance. Girls in the intervention group spent 30 mins/day less in screen-based

activities than their control group peers. Our findings have important implications and may help address the increasing burden of pediatric and adolescent obesity observed in areas of social and economic disadvantage.

Behaviors, attitudes and physical morbidity that develop during adolescence have profound implications for current and future health⁴⁵, yet surprisingly few adolescent obesity prevention interventions have been designed and evaluated. The challenges of working with adolescents⁴⁵ may explain both the small number of studies and their modest results. Small differences can be meaningful at the population level, and the favorable changes in BMI z-score (-0.08 [-0.20 to 0.04], $p = 0.1691$) and percentage body fat (-1.09 [-2.88 to 0.70], $p = 0.2033$) observed in our study may have clinical importance. A recent longitudinal study⁴⁶ found that a 1% increase in percentage body fat was related to increases of 1.042 mg/dL and 0.621 mg/dL in total cholesterol in boys and girls, respectively. Similarly, the school-based diabetes risk reduction intervention, known as the HEALTHY study, resulted in a small but statistically significant reduction in BMI z-score (-0.05), which was accompanied by smaller increases in fasting insulin levels (i.e., 4.0 U/ml in control group versus 3.8 U/ml in the intervention group). Increases in body fatness during youth are consistently associated with adverse changes in plasma lipids^{46, 47} and further study of the health implications of weight gain during this period will help to determine the clinical importance of intervention effects.

A number of recent obesity prevention interventions targeting adolescent and preadolescent girls have been evaluated in school and community settings. The New Moves intervention was similar in size and intervention design to the NEAT Girls program, but improvements in body composition were half the magnitude to those observed in our study (adjusted difference in BMI and percent body fat -0.10 and -0.46, respectively). The Stanford and Memphis GEMS interventions^{18, 20} were two well-designed obesity prevention interventions targeting unhealthy weight gain in pre-adolescent African-American girls from low-income communities. The interventions resulted in positive changes in secondary outcomes, but there

were no treatment effects for BMI over the two year study period. Although both schools and community settings offer promise for the prevention of obesity in youth, more work is needed to translate the strong effects typically observed in small-scale efficacy studies to large-scale effectiveness trials.

Girls in the intervention group did not increase their physical activity, but substantial differences in screen time were observed over the study period. Young people spend 2–4 hours per day in screen-based recreation and 5–10 hours per day sedentary, both of which are associated with a range of adverse health consequences⁴⁸. Targeting time spent in sedentary behavior has emerged as an effective strategy for preventing unhealthy weight gain in youth^{49, 50}. Screen time is associated with unhealthy dietary behaviors in youth⁵¹ and the reductions in screen time observed in the intervention group may have helped to reduce energy intake. Although we did not observe clinically important changes in dietary intake, this could be due to the lack of sensitivity in the FFQ used in our study.

Culturally appropriate obesity prevention interventions appear to be more effective than those that disregard cultural identity²¹. Although NEAT Girls was not targeted toward a specific cultural group, the importance of addressing cultural uniqueness is relevant to our study and we employed a number of strategies to ensure that the intervention was tailored and relevant to the participants. For example, the intervention logo and materials were branded and tailored to appeal to adolescent girls. A variety of novel strategies were used to engage girls in the interactive seminars (e.g. game show format) and participants were encouraged to bring their own music to be play on a portable digital music player in the enhanced school sport sessions. The enhanced sports sessions focused on lifetime activities that are appealing to adolescent girls and the nutrition workshops involved the preparation of inexpensive healthy snacks and meals. Both the enhanced school sport sessions and the nutrition workshops were rated favorably by girls, but the attendance at sessions was not as high as anticipated. Girls were also sent text messages in the critical window straight after school, encouraging physical activity and healthy

eating and discouraging screen time. The number of technology-based interventions targeting obesity prevention and treatment in youth has increased dramatically in recent years⁵². While these approaches have demonstrated some promise, we suggest that e-health technology should be used to supplement school-based interventions, rather than as a replacement. The importance of engaging parents in obesity prevention programs has been noted in the literature⁵³. NEAT Girls involved parental newsletters and home challenges to engage parents in the intervention, but we did not survey parents and cannot determine if parental behaviors and support changed as a result of the intervention.

We underestimated the school level intraclass correlation coefficients (ICC) for the body composition variables in the NEAT Girls study. School-based studies rarely report ICC values and the values we used to estimate our sample size were much lower than those found at baseline (i.e., BMI = 0.03, BMI z-score = 0.03 and percent body fat = 0.11), thus reducing our statistical power. We conducted additional statistical analyses that adjusted for the clustered nature of the data, but did not include ‘time’ as a random effect and found a significant intervention effect for percent body fat ($p = 0.024$) and a marginally significant effect BMI z-score ($p = 0.099$).

The strengths of this study include the group RCT design, the monitoring of intervention compliance, the unique study population and the high level of participant retention. However, there are some limitations that should be noted. First, despite employing a number of strategies to improve monitoring compliance, only a small number of participants provided useable accelerometer data at baseline (53.5%) and posttest (24.9%). Second, dietary intake was assessed using a FFQ, which lacks sensitivity to detect small changes in energy intake. Finally, screen time was measured using self-report and the results may be influenced by experimenter expectancies and evaluation apprehension.

In summary, the NEAT Girls intervention resulted in small improvements in body composition and large reductions in self-reported screen-time. Our findings demonstrate the

potential for multi-component school-based interventions for the prevention of unhealthy weight gain in adolescent girls attending schools in low-income communities.

Author contributions: Lubans had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the analyses. *Study concept and design:* Lubans, Morgan, Collins, Plotnikoff, Okely and Callister. *Acquisition of data:* Dewar. *Analysis and interpretation of data:* Lubans and Batterham. *Drafting of manuscript:* Lubans. *Critical revision of the manuscript:* Morgan, Dewar, Collins, Plotnikoff, Okely, Callister and Batterham. *Statistical analysis:* Lubans and Batterham. *Obtained funding:* Lubans, Morgan, Collins, Plotnikoff, Okely and Callister.

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Table 1: Characteristics of study sample

Characteristics	Control (<i>n</i> = 179)		NEAT Girls (<i>n</i> = 178)		Total (<i>N</i> = 357)	
	Mean	SD	Mean	SD	Mean	SD
Age (years)	13.20	0.45	13.15	0.44	13.18	0.45
Country of birth, <i>n</i> (%) ^a	174	97.2%	175	98.3%	349	97.8%
English language spoken at home, <i>n</i> (%) ^b	176	98.3%	176	98.9%	352	98.6%
Cultural background ^c						
Australian, <i>n</i> (%)	153	85.5%	152	85.4%	305	85.4%
Asian, <i>n</i> (%)	1	0.6%	3	1.7%	4	1.1%
European, <i>n</i> (%)	18	10.1%	18	10.1%	36	10.1%
Other, <i>n</i> (%)	7	4.0%	4	2.2%	11	3.1%
Weight (kg)	58.37	13.78	58.41	14.15	58.39	13.95
Height (m)	1.61	0.07	1.60	0.06	1.60	0.07
BMI (kg/m ²)	22.59	4.49	22.70	4.68	22.64	4.58
BMI <i>z</i> -score	0.78	1.17	0.82	1.12	.80	1.14
BMI Category						
Underweight, <i>n</i> (%)	1	0.6%	1	0.6%	2	0.6%
Healthy weight, <i>n</i> (%)	99	55.3%	103	57.9%	202	56.6%
Overweight, <i>n</i> (%)	50	27.9%	43	24.2%	93	26.1%
Obese, <i>n</i> (%)	29	16.2%	31	17.4%	60	16.8%

Abbreviations: SD, standard deviation; BMI, body mass index; SEP, socioeconomic position.

^aParticipants born in Australia

^bParticipants who speak English at home.

^cOne participant did not report their cultural background.

^dSocioeconomic position by population decile using SEIFA Index of Relative Socioeconomic Advantage and Disadvantage. 1 is the lowest and 10 is the highest.

Table 2: Changes in Primary and Secondary Outcomes Measures and Group Differences

Measure	Baseline, Mean (SD)		12 Month, Mean (SD)		Adjusted Difference in Change (95% CI) ^a	Group * Time <i>P</i>
	Control Group (n = 179)	Intervention Group (n = 178)	Control Group (n = 153)	Intervention Group (n = 141)		
BMI (kg/m ²)	22.59 (4.49)	22.70 (4.7)	23.37 (4.68)	23.30 (4.71)	-0.19 (-0.70 to 0.33) †	0.44
BMI z-score	0.78 (1.16)	0.82 (1.12)	0.81 (1.17)	0.76 (1.16)	-0.08 (-0.20 to 0.04) †	0.17
Body fat (%)	28.31 (6.76)	29.58 (6.54)	32.55 (5.87)	32.72 (5.85)	-1.09 (-2.88 to 0.70) †	0.20
Push-up test (repetitions) ^b	11 (10)	10 (10)	10 (10)	11 (12)	2.38 (-2.47 to 7.22) †	0.24
Prone support test (seconds) ^b	36.84 (39)	44.0 (39)	42.82 (36)	50.0 (38)	-4.44 (-17.93 to 9.04)	0.56
Accelerometer counts per min ^{b,c}	383.33 (122.40)	403.35 (160.80)	338.20 (170.20)	318.40 (146.80)	-46.19 (-123.26 to 31.88)	0.33
MVPA min/day ^{b,c}	32.00 (18.70)	34.64 (25.30)	20.83 (22.30)	21.03 (12.20)	-4.28 (-13.82 to 5.25)	0.97
Screen time daily (min/day) ^b	220.71 (163.0)	240.0 (206.0)	248.57 (178.0)	231.43 (215.0)	-30.67 (-62.43 to -1.06) †	0.02
Screen time weekday (min/day) ^b	209.0 (138.0)	216.0 (211.0)	236.00 (175.0)	222.0 (186.0)	-25.39(-54.14 to 3.36) †	0.08
Screen time weekend (min/day) ^b	255.0 (270.0)	300.0 (270.0)	300.0 (233.0)	285.0 (240.0)	-42.90 (-100.41 to 14.61) †	0.13
Mean daily energy intake kcal/day	2241.19 (1259.76)	2598.81 (1763.57)	2233.81 (1551.90)	2524.76 (1610.0)	-61.98 (-464.20 to 340.25) †	0.74
Adjusted mean daily energy intake per kcal/kg/day ^b	36.70 (25.63)	35.64 (29.45)	33.05 (25.68)	35.65 (32.25)	-0.52 (-7.31 to 6.27) †	0.64
Perceived body fatness (low=1 to high=5)	3.88 (1.51)	3.75 (1.48)	3.78 (1.46)	3.84 (1.49)	0.19 (-0.10 to 0.47) †	0.18
Physical self-esteem (low=1 to high=5)	3.74 (1.25)	3.71 (1.26)	3.63 (1.17)	3.75 (1.28)	0.17 (-0.15 to 0.48) †	0.26
Global self-esteem (low=1 to high=5)	4.28 (1.01)	4.16 (1.09)	4.29 (0.99)	4.09 (1.10)	-0.08 (-0.30 to 0.14)	0.44

Abbreviations: BMI, body mass index; CI, confidence interval; MVPA, moderate-to-vigorous physical activity

^aAdjusted mean difference and 95% CI between NEAT Girls and control groups after 12-months (Intervention minus control).

^bData were transformed due to non-normality, median and interquartile range provided.

^c191 and 89 participants wore accelerometers for ≥600 minutes on ≥4 days including a weekend day at baseline and posttest, respectively.

†Changes in favor of the intervention group.

Figure 1: Flow of Participants Through the Study

