

# Fit “n” Cool Kids: Effects of Peer-Modeling and Goal Setting on Physical Activity

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## Abstract

**Background:** Decreasing the risk of overweight and obesity from an early age is imperative and efforts should focus on fostering children’s physical activity (PA). Within school-based interventions, there is insufficient evidence on the effectiveness of the use of character peer-modeling and goal setting to increase physical activity. Therefore, the purpose of this study was to examine the impact of a school-based intervention on PA and enjoyment of PA in grades 3 - 5 elementary school age children at two urban elementary schools. **Methods:** Participants were 95 students of 8 - 10 years old; activity monitors were used to assess physical activity. Daily physical activity and enjoyment was recorded at baseline, intervention, and at a 6-school-week follow-up. **Results:** PA significantly increased in the intervention school averaging 5549 steps at baseline, 5889 steps during the intervention, and 6515 during follow-up ( $p < 0.05$ ). Participants significantly increased their moderate to vigorous physical activity from 28.54 min at baseline to 30.06 minutes at week 4 and 36.45 during follow-up ( $p < 0.05$ ). There was no change in enjoyment levels from baseline to follow-up. **Conclusion:** The Fit “n” Cool Kids intervention presents the potential of peer-modeling and goal setting for increasing PA at school. Continued interventions in schools may positively influence children’s healthy living patterns.

## Keywords

Health, MVPA, Physical Education, School Health, Youth

## 1. Introduction

It is recommended that children engage in moderate to vigorous physical activi-

ty (MVPA) for 60 minutes every day or accumulate 12,000 steps/day [1]. It is also suggested that 30 minutes [2] or 5505 steps [3] of this total should be accumulated at school. This amount of PA grants both short- and long-term physical and psychological health benefits such as obesity prevention and cardiovascular and bone health. Furthermore, psychological benefits include improved mental health, reduced stress, depression, anxiety, and improved self-esteem [4].

Schools naturally expose children to PA by providing students opportunities to be physically active during recess, lunch, and physical education (PE) [5]. Schools also have existing facilities, staff, curricula, and policies that contribute to the potential to promote PA [6]. Developmentally, the upper elementary school years are a time when peers and peer influences become extremely important to children [7]. Children tend to be more physically active when surrounded by peer support, encouragement, and peer modeling [8]. Peers have the ability to influence decisions made by children starting around the age of ten [9]. Children's choice to be physically active is influenced by their peers and their social environment via encouragement, companionship, and modeling [10]. Several cross-sectional studies indicate that boys and girls tend to be more physically active when surrounded by peer support, encouragement, group physical activity programs, and peer modeling [11] [12]. Enjoyment has also been shown to be a factor in PA participation in children [13]. Enjoyment increases motivation to participate in PA [14]. Previous intervention research [11] [15] has illustrated that schools utilizing goal setting have also had success in increasing youth step counts.

Previous research has suggested that characters (e.g. cartoons) can influence children's health behavior [16]. Studies have primarily focused on fictional characters and their influence on dietary choices in children [17]. These popular characters have a powerful influence on children's food preferences, choices and intake. Horne *et al.* [18] created fictional characters called the "Food Dudes" that they used as character peer models to change fruit and vegetable intake of primary school children. The study suggested significant increases in fruit and vegetable consumption of the participants. Later the "Food Dudes" evolved to promote physical activity and were called the "Fit 'n' Fun dudes" [11] [15]. Horne *et al.* [15] developed an eight-day intervention that used the characters and rewards to increase physical activity. They found significant increases in daily step counts during the study when compared to a control group. During a follow-up, only the girls in the study had maintained their step increases. Similarly, Hardman *et al.* [11] used the "Fit 'n' Fun Dudes" alongside step goals and rewards during a 12-day intervention. They reported increases in physical activity during the intervention but a return to baseline physical activity during the follow-up stage. The authors suggested the elimination of the rewards may have limited the continued success of the program.

To our knowledge, no studies have examined the impact of character peer modeling and goal setting without the rewards on children's physical activity. Therefore, the purpose of this pilot study was to examine the impact of

school-based character peer models and goal setting on PA (steps and MVPA) and enjoyment in grade 3 - 5 elementary school age children at two urban elementary schools in the Mountain West US.

## **2. Methods**

### **2.1. Participants and Setting**

A total of 95 students in grades 3 - 5 from two elementary schools in the Mountain West of the US were invited to participate at the beginning of the school year. The two schools were randomly assigned to either the intervention or the control condition. The intervention schools' student body consisted of 74% White, 15% Hispanic, 4% Black, and 7% other. The control schools' student body consisted of 78% White, 15% Hispanic, 3% Black, and 4% other. 54% of the student body in both schools qualified for free or reduced lunch. Approval from the university's Institutional Review Board was obtained as well as child assent and parental consent prior to the study beginning.

### **2.2. Instrumentation**

Piezoelectric activity monitors (New Lifestyles NL-1000) were used to assess number of steps taken and minutes in MVPA. The NL-1000 has been previously validated in children [19] and has been utilized to measure free living physical activity of youth at school [20]. Students practiced wearing monitors prior to the study to control for a novelty effect; each monitor had been previously calibrated according to manufactures standards and each case was unsealed so that participants could open it at any point during the intervention and monitor their progress.

Enjoyment of PA was assessed using a single item measure called the Funometer. Participants marked their level of enjoyment on a thermometer-type figure portrayed on paper at baseline, each week of the intervention, and at the end of the follow-up phase. The bottom of the thermometer was marked 0 indicating "No Fun at All". The scale had equally spaced tally marks from 1 to 10 with a 10 marked as "Lots of Fun." Students colored in the thermometer to a specific tally mark that represented the overall level of enjoyment they experienced during baseline, intervention, and follow-up. This instrument has previously been validated in elementary and middle school aged children [21].

Height was measured using a SECA 213 stadiometer (Chino, CA, USA); weight was measured using a Tanita HD-314 electronic scale (Arlington Heights, IL, USA). Sitting height was measured to control for maturation [22]. Each participant's body mass index (BMI) was calculated using a weight  $\text{kg}/\text{m}^2$ .

### **2.3. Intervention**

Character peer modeling was defined as characters who represented appropriate PA behaviors and intended to teach those skills to other children. Supporting classroom teachers were provided with a series of short letters from the Fit "n"

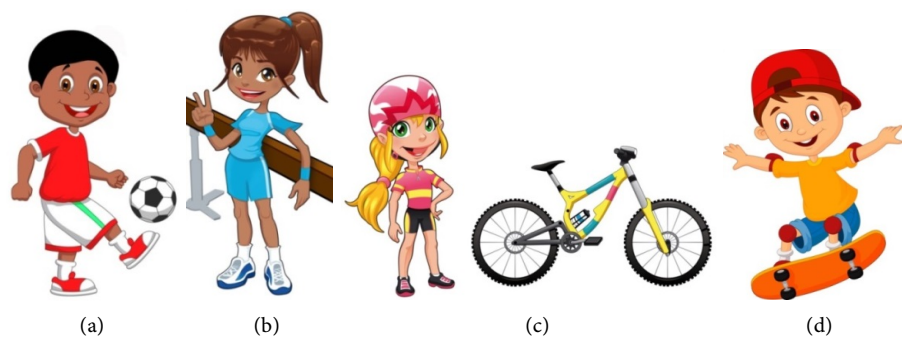
Cool Kids which were read at the beginning of each day in the classroom. These letters encouraged students to be active and included ideas on how to incorporate PA into their daily routine including an “Activity of the Day” section which promoted a different activity to be carried out on each day of the intervention. For example, jump roping at recess, running a few extra laps in PE, etc. The Fit “n” Cool Kids’ were created by the first author and their names were associated with PA and fitness as follows: Endurance Eddie, Flexible Fiona, Strong Samantha, and Speedy Pete. Each character had skills and interests that embodied the attribute of fitness representative of their name (e.g., Eddie has great endurance which makes him a good soccer player). The intervention was based on previous character peer modeling programs [11] [15]. **Figure 1** is a depiction of the Fit ‘n’ Cool Kids characters.

## 2.4. Procedures

Monitors were distributed by the classroom teachers to the students at the beginning of each school day and were collected at the end of the day. Anthropometrics were measured during PE class by the PE teachers. Students were instructed to wear their activity monitors on the right hip directly in line with the right knee for the entire school day. The student’s PA and MVPA were recorded for four school days [23].

The intervention phase was 20 school days (4 weeks) immediately following baseline. Initial activity monitor step target goals were computed based on each individual’s baseline step counts mean. An additional 1000 steps was added to the student’s baseline mean to create a target step count goal (e.g. if a student moved 5500 steps during the baseline phase, their target step count goal became 6500 steps). The target goal step count was determined based on previous research [11]. If an individual student easily reached their goal, it was increased by 10% from week to week; if they struggled to meet their goal, it was reduced by 10% by the researcher to increase attainability and increase competence.

Students were introduced to the Fit “n” Cool Kids on day one of the intervention. Colorful posters were displayed around the schools; each student received a letter from the Fit “n” Cool Kids with his or her step goal and was instructed to



**Figure 1.** Fit “n” Cool Kids characters. (a) Endurance Eddie; (b) Flexible Fiona; (c) Strong Samantha; (d) Speedy Pete.

reach their goal as many days as possible during the intervention. At the end of each week, step counts and MVPA were recorded and students who achieved their goal were given written praise from the character peer models. Children who didn't reach their activity step count goal were encouraged to keep trying. During the Intervention phase the control children received their usual school-day PA opportunities.

Post intervention follow-up was conducted six school weeks after the intervention had been removed [24]. PA and MVPA were recorded in both schools during to determine the sustained impact of Fit "n" Cool Kids.

## 2.5. Data Analysis

For each participant, data were examined to determine the mean and standard deviation for step counts and minutes spent in MVPA during baseline, intervention, and follow up. A 2 (intervention, follow-up)  $\times$  2 (experimental, control) factorial ANCOVA was used to analyze time and group effects on PA with baseline as the covariate. A 2 (intervention, follow-up)  $\times$  3 (grade, gender, BMI) factorial ANCOVA was used to analyze time and group differences on enjoyment with baseline as the covariate. An alpha level of 0.05 was set for all tests.

## 3. Results

To be included in the intervention and follow-up analysis, participants needed to have at least three complete days of activity monitor data during each week of the intervention phase and at least three days of data during the follow-up phase. The final sample sizes for inclusion in the analysis were 54 children. The most frequent reasons for participant exclusion were missing data points due to losing or resetting of monitors, forgetting to wear activity monitors, and absence from school. Outlier cases were also eliminated from the final sample using box plots. Validity was checked by having participants fill out a previous day PA recall [25]. Baseline characteristics of the sample included in the analysis are shown in **Table 1**.

Results showed no significant difference between schools at baseline  $F_{(1,93)} = 3.76$ , ( $p > 0.05$ ),  $\eta_p^2 = 0.005$ . Significant difference in step counts were found between schools during the intervention phase  $F_{(1,50)} = 5.475$ , ( $p = 0.023$ ),  $\eta_p^2 = 0.099$ , and the follow-up phase  $F_{(1,50)} = 9.98$ , ( $p = 0.003$ ),  $\eta_p^2 = 0.166$ . Furthermore, significant differences in MVPA were found between the schools during the intervention phase  $F_{(1,50)} = 5.00$ , ( $p = 0.030$ ),  $\eta_p^2 = 0.091$  and follow-up phase  $F_{(1,50)} = 8.726$ , ( $p = 0.005$ ),  $\eta_p^2 = .149$ . **Table 2** represents the mean steps and MVPA during baseline, intervention, and follow-up phases. No significant differences in enjoyment were detected at baseline, intervention, and follow-up  $F_{(1,46)} = 0.913$ , ( $p > 0.05$ ),  $\eta_p^2 = 0.015$ .

## 4. Discussion

Students in the intervention school significantly increased their steps and MVPA while being exposed to Fit "n" Cool Kids. Students also significantly increased

**Table 1.** Baseline characteristics of the included sample.

Variable	Intervention School (n = 46)	Control School (n = 49)
Standing Height	142.03 ± 20.22	146.30 ± 6.55
Weight	74.2 ± 14.48	67.44 ± 19.53
BMI	17.35 ± 2.57	16.87 ± 2.19
Sitting Height	73.20 ± 10.67	74.86 ± 3.41

Note. ± = standard deviation.

**Table 2.** Adjusted Means for steps and MVPA at baseline, intervention, and follow-up.

School	Baseline	Intervention	Follow-up
Control (n = 26)			
Steps	5375.15 ± 178.58	5344.39 ± 194.07	5538.01 ± 222.17
MVPA	25.42 ± 1.15	26.85 ± 1.15	28.22 ± 1.72
Experimental (n = 28)			
Steps	5549.40 ± 176.71	†5879.79 ± 187.26	†6499.20 ± 258.24
MVPA	28.54 ± 1.13	†30.06 ± 1.11	†36.26 ± 2.003
Partial Eta Squared			
Steps	0.005	0.099	0.166
MVPA	0.039	0.091	0.149

Note. ± = standard error; † = statistically significant.

their steps and MVPA during the follow up phase. Our findings suggest that peer-modeling and goal setting were effective at increasing steps and MVPA, and are in support of other studies [26]. These findings are similar to previous research [14] [21] that showed initial increases in physical activity when using peer modeling. These two previous studies used a rewards system which led to decreases in step counts upon the end of the intervention. The current study showed that physical activity continued to increase after the removal of the rewards. Rewards have shown to weaken ones intrinsic motivation [27] and can be seen as controlling which can reduce the feeling of autonomy thus undermining intrinsic motivation [28]. Our study eliminated the rewards system and focused solely on the setting of individual goals and encouragement from the peer models. Throughout the intervention phase, efforts to maximize autonomy were made by allowing students to choose when, where, and how they were physically active. The intervention gave the students ideas on how to be physically active but they ultimately choose their avenue for PA. Giving the students a sense of autonomy is important because research has shown that it can lead to greater interest and satisfaction in PA [29].

Furthermore, students in the intervention group were asked how much fun they had while being physically active during baseline, intervention, and follow-up. No significant differences were found throughout the three phases of the

study. This may be due to student's PA enjoyment already being high during baseline of the study ( $8.73 \pm 2.19$ ) creating a ceiling effect.

Importantly, findings in the current study showed the intervention allowed for participants to meet the daily recommended level of physical activity at school [2]. Participants in the current study were already close to meeting these recommendations at baseline which were also higher than what we typically see in elementary aged children at school [30] [31]. Furthermore, students at follow up accumulated more than half of their daily recommendations. Previous studies have suggested that a majority of youth physical activity is accumulated outside of school [32] suggesting that these participants will also be set up to meet daily habitual recommendations.

## 5. Strengths and Limitations

Strengths of the study include the use of objective monitors; second, the intervention focused on underserved populations; and lastly, the intervention is easy to implement for teachers and requires low cost for school districts. This third point is especially important given the relative lack of resources in schools for promoting physical activity. Typical efforts in school to promote physical activity include changes in structure, equipment, curriculum, or even personnel [33].

A limitation to the study was related to the number of cases that were not used due to missing data. Students lost, accidentally reset the monitors or being absent from school all led to missing data points which had an impact on the number of participants who were included in the data analysis. Another limitation was due to the time between the end of the intervention and the beginning of the follow-up phase. Results showed an increase of PA during the intervention and follow-up phase however, the long-term maintenance of this behavior is an important issue that should be examined further. Previous research [34] identifies maintenance as a period beginning six months after the initiation of the target behavior. A follow-up of six months succeeding the removal of the intervention could be established in other studies to determine if maintenance has occurred. Future research should include a large sample size and could include other outcomes around fitness or nutrition.

## 6. Conclusions

The Fit "n" Cool Kids intervention produced significant increases in step counts and MVPA. This suggests that peer-modeling and goal setting may promote motivation needed to increase PA among children. Further studies with elongated follow-up phases are desired to determine the extent to which this change is maintained in the absence of an intervention.

It is recommended that children should be active at least 60 minutes a day at MVPA intensity [1]. Our results showed that during the intervention, children were moderate to vigorously physically active 30 minutes of the school day and their MVPA increased to 36 minutes at follow-up suggesting the students ex-

ceeded recommendations [2]. This shows that the intervention allowed for students to get at least half of their daily PA while at school. Results also showed that enjoyment was preserved throughout the intervention which is important because children are more likely to participate in PA if they enjoy what they are doing [8].

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