# FIT 'N' COOL KIDS: CHILDREN'S EXPERIENCES AND THE EFFECTS OF CHARACTER PEER MODELING AND GOAL SETTING ON CHILDREN'S PHYSICAL ACTIVITY AND FRUIT AND VEGETABLE CONSUMPTION

by

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# ABSTRACT

Efforts to decrease the risk of overweight and obesity from an early age should focus on children's physical activity (PA) and fruit and vegetable (FV) consumption. Within school-based interventions, there is insufficient evidence on the effectiveness of the use of peer modeling and goal setting to determine changes in step counts, moderate to vigorous physical activity (MVPA), and FV consumption. This dissertation undertook a three-study approach to examine the impact of a school-based intervention on PA intensity and FV consumption intensity in third- to fifth-grade and to examine students' experiences participating.

Students participated in the project for 6 weeks. Activity monitors were used to assess number of steps taken and the number of minutes spent in MVPA. FV consumption was measured by direct observation and a nutrition questionnaire. Students received a letter from the Fit 'n' Cool Kids with his or her activity monitor target goal as well as FV consumption goal.

Results showed no significant difference between the control school and intervention school at baseline $F_{(1,186)} = 3.62$, ($p > .05$). Steps taken were statistically significantly greater in the intervention ($M = 5631.471$, $SE = 249.443$, $p < .05$) compared to the control group over time ($M = 3151.027$, $SE = 182.432$, $p < .05$). There was a statistically significant effect of time on step counts for the intervention group, $F$ (5, 110) = 4.082, $p = .002$, partial $\eta^2 = .157$. There was a statistically significant interaction

between the intervention group and MVPA over time, $F$ (4.222, 270.207) = 2.804, $p$ < .05, partial η2 = .042, ε = .844. MVPA was statistically significantly greater in the intervention ($M$ = 20.43, $SE$ = 0.990, $p$ < .05).

In the qualitative study, participants mentioned that the intervention as a whole was fun for them. The students thought that the characters were cool and expressed that it was fun to see characters they could relate to. The goal setting kept them interested in the intervention and increased their motivation to participate each week.

The intervention showed the potential of self-monitoring, goal setting, and peer modeling for increasing MVPA and step counts at school.

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# CHAPTER 1

## INTRODUCTION

Obesity has been on the rise among children in the United States (US) and has tripled since the 1970s (Paxson, Donahue, Orleans, & Grisso, 2006). Childhood obesity statistics indicate that 31.8% of youth in the U.S. aged 2-19 years have a body mass index (BMI) classified as overweight, 16.9% classified as obese, and 12% are severely obese (Ogden, Carroll, Kit, & Flegal, 2012). Many health risks are associated with childhood obesity, including type II diabetes, high cholesterol, and high blood pressure (Crombie, Ilich, Dutton, Panton, & Abood, 2009).

Decreasing the risk of overweight and obesity from an early age is imperative and efforts should focus on children's physical activity (PA) and fruit and vegetable (FV) consumption (Brown & Summerbell, 2009; Dietz & Gortmaker, 2001; Ledoux, Hingle, & Baranowski, 2011). Studies have shown that children who are considered overweight or obese have lower levels of PA compared to children who are in a healthy weight range (Fairclough et al., 2013, Hsu et al., 2011, Stevens et al., 2007; Stevens et al., 2004). Other studies have shown that the majority of children in the US are not meeting the recommended daily FV consumption, which contributes to the high obesity trends (Krebs-Smith, Guenther, Subar, Kirkpatrick, & Dodd, 2010). It is recommended that children engage in moderate to vigorous physical activity (MVPA) for 60 minutes every

day or take a minimum of 12,000 steps/day (Colley, Janssen, & Tremblay, 2012). This amount of PA grants both short-term and long-term physical and psychological health benefits. Sustained levels of PA have a positive effect on children's weight status, metabolic health, and body composition (Power, Ullrich-French, Steele, Daratha, & Bindler, 2011). Regular participation in PA also offers substantial health benefits such as obesity prevention, cardiovascular fitness, and bone health (Camacho-Minano, LaVoi, & Barr-Anderson, 2011). Furthermore, psychological benefits include improved mental health, reduced symptoms of stress, depression, anxiety, and improved self-esteem (Halyk, Brittain, Dinger, Taylor, & Shepard, 2010; Power et al., 2011). Studies also link regular participation in MVPA with improvements in children's cognitive functioning and academic achievement (Davis et al., 2011; Krafft et al., 2014; Schaeffer et al., 2014).

Proper nutrition and increasing the consumption of fruits and vegetables has also been found to be an important component of obesity prevention (Lock et al., 2005; Thirlaway & Upton, 2008). The US Dietary Guidelines advise adolescents to consume five or more servings of FV per day. Increasing the amount of FV consumption among adolescents may decrease the risk of cardiovascular diseases, diabetes, obesity, and certain types of cancer as they get older (Bazzano, 2006). A diet high in FV consumption also contributes to increased satiety and reduced food intake, leading to healthy weight management (Rolls, Ello-Martin, & Tohill, 2004).

The majority of children in the United States are in school for 30-35 hours per week, which makes schools an ideal setting for promoting PA and FV consumption (Latimer, 2009; Verstraete, Cardon, De Clercq, & De Bourdeaudhuij, 2006). There is a significant need to foster PA and FV consumption in school because many studies

indicate that children in the US are reaching less than 33% of their daily recommended step counts (Erwin et al., 2011; Erwin et al., 2012; Kulinna, et al., 2012; Reznik et al., 2013) and are eating less than one cup of fruits and vegetables while at school (Horne et al, 2011; Ishdorj, Crepinsek, & Jensen, 2013; Lowe et al., 2004).

Schools naturally expose children to PA by giving students' opportunities to be physically active during the school day via recess, lunch, and physical education (PE) (Khambalia, Dickinson, Hardy, Gill, & Baur, 2011). Schools are also a logical choice for implementing PA and FV consumption interventions due to facilities, staff, curricula, policies, and their environments that add to the potential to promote healthy choices (Fairclough et al., 2013). Encouraging PA and FV consumption while children are in elementary school is particularly important because these begin to decline swiftly during upper elementary years (Strauss, Rodzilsky, Burack, & Colin, 2001; Trost et al., 2002; Tudor-Locke et al., 2011; USDA Center for Nutrition Policy and Promotion, 2008).

## Statement of the Problem

Overall, there are a number of studies that examine the value of school-based interventions; however, the majority of these interventions do not target PA and FV consumption. Table 1.1 represents studies that have examined school-based interventions among adolescents. Furthermore, there is limited research that has examined MVPA along with step counts among elementary-aged children in the US. This provides a need for more information regarding MVPA, and PA in younger children. Also, because children are not meeting the recommended daily values of FV consumption, there is a need for interventions that encourage increasing these behaviors among young children.

This project adds to the literature by using a quantitative methodology utilizing systematic observation, direct observation, and questionnaires to examine the effects of Fit 'n' Cool Kids on children's PA and FV consumption. Lastly, there is limited research examining students' lived experiences of school-based interventions. Therefore, a qualitative examination of students' experiences participating in a school-based intervention may help us understand the benefits and barriers to these types of interventions. Table 1.1 lists studies that examined the impact of school-based PA and nutrition interventions.

## The Intervention

The Fit 'n' Cool Kids character peer modeling curriculum, developed by the first author in 2014, was used as the intervention platform in this study. For the intervention, character peer modeling was defined as 'characters who represent appropriate PA and FV consumption behaviors and intend to teach those skills to other children'. This occurred through modeling and prompting PA and FV consumption. The Fit 'n' Cool Kids also praised children on their PA and FV consumption (Charlop, Schreibman, & Tryon, 1983). This intervention was an adaptation of The Fit 'n' Fun Dudes that was developed in the UK for elementary-aged children that has since been fazed out (Hardman et al., 2011). It was validated in a pilot study conducted in 2013 (Larson et al., 2015). Fit 'n' Cool Kids is a school-based PA and nutrition intervention that encourages children to be physically active and eat fruits and vegetables through character peer modeling and goal setting. The Fit 'n' Cool Kids' names are associated with PA; Endurance Eddie, Flexible Fiona, Strong Samantha, and Speedy Pete. Each character has skills and interests that

embody the attribute of fitness representative of their name (e.g., Eddie has great endurance, which makes him a good soccer player.). Each character peer model also has a favorite fruit or vegetable group that they promote as healthy and beneficial (e.g., Samantha feels energized when she eats berries such as strawberries, raspberries, and blueberries). Figure 1.1 is a depiction of the Fit 'n' Cool Kids characters. This intervention also incorporates goal setting as an avenue for increasing PA and FV consumption.

For this study, classroom teachers implemented the Fit 'n' Cool Kids intervention. Classroom teachers read a series of letters from the Fit 'n' Cool Kids at the beginning of each day of the intervention phase (4 school weeks). Classroom letters encouraged students to be physically active and included ideas on how to incorporate PA and FV consumption into their daily routine. The letters discussed the natural benefits of being physically active, eating healthy, and included an 'Activity of the Day' as well as a 'Fruit and Vegetable of the Day' section that promoted a different activity to be carried out on each day of the intervention such as jump roping at recess and encouraged FV consumption. In addition, posters of the Fit 'n' Cool Kids were hung up around the school during the intervention to encourage and remind students to be physically active and eat their fruits and vegetables.

## Study Purpose

This dissertation undertook a three-study approach to examine (a) the impact of a school-based intervention on PA intensity and enjoyment in third- to fifth-grade elementary-aged children (Chapter 3), (b) the impact of a school-based intervention on

PA intensity and FV consumption in fourth- to fifth-grade elementary-aged children (Chapter 4), and (c) elementary school students' experiences participating in Fit 'n' Cool Kids (Chapter 5). A quantitative methodology was used in the first two studies and a qualitative methodology was used in the third study. Chapter 2 provides a literature review on school-based intervention programs and Chapter 6 a discussion of the three studies.

## Significance

The current study was intended to extend previous research in several important ways. First, while the aforementioned research suggests that school-based interventions increase PA, it is not known if an intervention of this nature increases MVPA among children in the US. Second, there is a need for interventions that encourage more FV consumption among elementary-aged children. Third, little research has been conducted on PA and FV consumption among underserved populations. Fourth, the intervention allows for easy to implementation, is low cost for school districts, and is theoretically driven. Because previous research outside of the US has found that interventions using peer modeling materials, pedometers, and daily pedometer goals have a significant effect on children's PA (Hardman, Horne, & Lowe, 2011), this current study focused on the effects a school-based intervention using character peer modeling, activity monitors, nutrition questionnaires, and daily goal setting on children's PA and FV consumption.

Additional research using activity monitors and nutrition questionnaire materials with school-based interventions was necessary in elementary-aged children. Therefore, the purpose of this study was to examine the impact of a school-based intervention on PA

intensity and FV consumption in fourth- to sixth-grade elementary-aged children enrolled in an urban elementary school in the Mountain West United States. A secondary purpose of the study was to examine students' experiences participating in the school-based intervention.

## Research Questions and Hypotheses

The current study addressed the following research questions: (1) Does the Fit 'n' Cool Kids intervention increase MVPA and step counts among elementary-aged children? (2) Does the Fit 'n' Cool Kids intervention increase FV consumption among elementary students? (3) What are students' perceptions about the Fit 'n' Cool Kids intervention? Based on previous research and theory, it was hypothesized that a school-based intervention that includes character peer modeling and goal setting would increase MVPA, step counts, and FV consumption among fourth- to fifth-grade elementary-aged children. The third research question did not have a tangible hypothesis attached to it.

## Definition of Terms

*Physical activity* is any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level (U.S. Department of Health and Human Services, 2008).

*Moderate to vigorous intensity physical activity* is any activity that requires a moderate to large amount of effort, and causes a noticeable to substantial increase in heart rate and breathing.

*Fruit and vegetable consumption* is the total number of servings of fruit and

vegetables that someone consumes on a given day.

*Activity Monitors* is an instrument for measuring acceleration and step counts while people are moving.

*School-Based Intervention* is an action(s) taken to improve a situation in a school setting.

*Title 1 School* is part of the Elementary and Secondary Education Act, as amended (ESEA) that provides financial assistance to local educational agencies (LEAs) and schools with high numbers or high percentages of children from low-income families to help ensure that all children meet challenging state academic standards.

Table 1.1 Studies Examining the Impact of School-Based PA and Nutrition Interventions

| Author, Year | Intervention | Location of Research | Dependent Variable | Results |
|---|---|---|---|---|
| Butcher, 2007 | Feedback Information | Liverpool, UK | PA | The intervention increased children's step counts per minute. ($p < 0.05$) |
| Cradock, 2014 | Boston Active School Day Policy | Boston, MA | PA | During the school day, the intervention group increased their MVPA and decreased their sedentary time. ($p < 0.05$) |
| Danielzik, 2006 | Kiel Obesity Prevention Study | Kiel, Germany | PA/FV consumption | The intervention had the most effects on girls and increased nutritional knowledge. ($p < 0.05$) |
| Fairclough, 2013 | Children's Health Activity and Nutrition: Get Educated! | Liverpool, UK | PA/FV consumption | Significant between-group effects were observed for waist circumference post intervention and BMI z-scores at follow-up. ($p < 0.05$) |
| Hardman, 2009; Horne, 2009 | Fit 'n' Fun Dudes | Bristol, UK | PA | Peer-modeling and goal setting increased children's step counts. ($p < 0.01$) |
| Hardman, 2011 | Fit 'n' Fun Dudes | Bristol, UK | PA | Peer-modeling, goal setting, and tangible rewards increased children's step counts. ($p < 0.01$) |
| Harrison, 2006 | Switch off – Get Active | Waterford, Ireland | PA | The intervention group increased their self-reported PA and self-efficacy. ($p < 0.05$) |
| Horne, 2009 | Food Dudes | Limerick, Ireland | FV consumption | Consumption of school provided food increased in the intervention school ($p < 0.001$) |
| Jones, 2013 | Gamification | Logan, UT | FV consumption | Fruit and vegetable consumption increased in the intervention school ($p < 0.05$) |
| Kipping, 2014 | The Active for Life Year 5 | Bristol, UK | PA | This intervention was not effective in increasing levels of PA ($p > 0.05$) |
| Mackintosh, 2011 | CHANGE! | Northwest England | PA/FV consumption | Fun, enjoyment, and social support were important predictors of PA participation. Families were also found to play an important role. |
| Naylor, 2008 | Action Schools! BC | British Columbia, Canada | PA | Boys in the intervention group took significantly more steps that boys in the control group ($p < 0.05$). No differences were found among girls. |
| Sahota, 2001 | Teacher training, modification of school meals, and school action plans | Leeds, UK | PA/FV consumption | Children in the intervention increased their vegetable intake ($p < 0.05$). No significant difference was found in PA |
| Springer, 2012 | Marathon Kids | US | PA/FV consumption | Intervention students reported a higher mean time of running as well as higher self-efficacy in PA and FV consumption. |

**Endurance Eddie**

**Flexible Fiona**

**Strong Samantha**

**Speedy Pete**

Figure 1.1 The Fit ‘n’ Cool Kids Characters

# CHAPTER 2

## LITERATURE REVIEW

Physical inactivity and a decrease in FV consumption is a growing concern among adolescents in the US. Troiano et al. (2008) assessed the PA levels from a sample of participants from the National Health and Nutrition Examination Survey and found that only 42% of children aged 6 to 11 years and 8% of adolescents obtained the recommended 60 minutes per day of MVPA. These statistics underline that the majority of youth do not participate in adequate levels of daily PA. Guenther et al. (2006) and Striegel-Moore et al. (2006) found that the majority of children in the US are not consuming the recommended amounts of FV on a daily basis. Both a lack of PA and a lack of FV consumption have been linked to overweight and obesity. This is concerning because overweight or obese children are more likely to become overweight or obese adults than children of normal weight (U.S. Department of Health and Human Services, 2001). Children who participate in MVPA 60 minutes or more each day and consume the recommended amounts of FV are likely to achieve substantial health benefits and have a better chance of a healthy adulthood (He et al., 2004; U.S. Department of Health and Human Services, 2008). Moreover, children who are active when they are younger tend to remain active in their adulthood (U.S. Department of Health and Human Services, 2008). Therefore, it is pertinent to instill the importance of leading physically active and

healthy lifestyles during elementary years. This literature review is organized into the following sections: (1) overview of school-based physical activity intervention programs, (2) overview of school-based nutrition intervention programs, (3) goal setting among elementary-aged children, and (4) students' perspectives toward school-based PA interventions.

## Overview of School-Based Physical Activity Intervention Programs

Over 95% of children in the US are in school for 30-35 hours per week, which makes schools an ideal setting for promoting PA and FV consumption (Verstraete et al., 2006). School-based PA and FV consumption can fight against obesity, because it targets early stages of pattern development and encourages lifelong participation in health-conscious behavior (Latimer, 2009; Webster, Monsma, & Erwin, 2010). Many school-based PA interventions intended for elementary, middle, and high school students target childhood obesity prevention. Most of these interventions focus on altering PA and nutrition behavior, while other interventions focus on decreasing television watching time, restricting drinking of carbonated drinks or increasing PE time in schools (Sharma, 2006).

An intervention program called Fit 'n' Fun Dudes was developed in the UK with a promising approach to increasing activity levels in children by using peer modeling, rewards, and pedometers (Horne, Hardman, Lowe, & Rowlands, 2009). In one study using Fit 'n' Fun Dudes, the 8-day intervention consisted of a song, personalized letters containing encouragement to be physically active, and posters of fictional characters who were presented as physically active children. The fictional characters were theorized to

act as positive physical activity and active lifestyle role models for the children in the school. The rewards intervention group was provided with peer-modeling materials, pedometers to wear, and set daily pedometer target goals to reach in order to obtain rewards. The efficacy was examined by comparing children's physical activity (step counts) in a rewards intervention group to a non-rewards-intervention group. The researchers found that girls in the experimental school took significantly more steps during both the intervention and follow-up phases compared to girls in the control group. Boys in the experimental group also took significantly more steps during the intervention phase when compared to boys in the control group, but there was no significant difference between the groups in the follow-up phase.

A second study using the Fit 'n' Fun Dudes was conducted by Hardman et al. in 2011. The purpose of this study was to examine the effects of rewards, peer modeling, and pedometer targets on children's PA. Researchers used Fit 'n' Fun Dudes materials along with tangible rewards to conduct a 12-day school-based intervention. In the full intervention school, rewards such as balls, Frisbees, and erasers were given to students who reached or exceeded their pedometer target goal each day. Students in the non-rewards-intervention school received the same materials and daily pedometer targets, but were not offered rewards. In place of rewards, they received verbal praise (e.g., Well done, you have passed your target goal.) for reaching their pedometer target goal each day.

This particular study found a significant difference in overall levels of PA among students in the intervention school. The study also found that the full intervention group had a significant change in step counts over time and had significantly higher step counts

than the non-rewards group and the control group during the intervention phase. During the taper phase, children's step counts in the full intervention group were not significantly different from baseline. The no-reward intervention also had a significant change in step counts over time and continued to increase their step counts throughout the taper phase.

These findings, while somewhat paradoxical, are not entirely surprising. Research has shown that rewards can weaken an individual's intrinsic motivation to participate in a task (Ryan & Deci, 2000). Deci, Koestner, and Ryan (1999) also conclude that rewards can be seen as controlling, which reduces the feeling of autonomy and undermines intrinsic motivation.

Numerous intervention programs have used activity monitors as a motivational and informative tool for measuring accrued PA levels in children (Beighle, Pangrazi, & Vincent, 2001). For example, in a 12-week intervention program using pedometers and daily step count targets, it was found that adolescent girls with low activity levels had enhanced PA-related outcomes within the short-term period of 6 weeks (Schofield, Mummery, & Schofield, 2005). In a different 4-week elementary school intervention, researchers used the concept of integrating pedometer walking throughout the school curriculum and found that children who had initial lower activity levels increased their step counts during intervention weekdays (Oliver & McEvoy, 2006). Moreover, in another study, the researchers found that though a short 3-week intervention program integrating pedometer wearing and goal setting did not significantly increase adolescents' step counts, the participants reported increased awareness and motivation towards health and PA (Zizzi et al., 2006). 'Switch Off-Get Active' was a low-cost intervention targeting 9- to 11-year-old children in school. It was conducted over a 16-week period aimed at

increasing PA and decreasing screen time (Harrison, Burns, McGuinness, Heslin, & Murphy, 2006). Children were encouraged to set personal goals for PA and screen time for the duration of the intervention. 'Switch—Off Get Active' intervention significantly increased children's MVPA and self-efficacy ($p < .05$). The supplementation of health curriculum with activity modification has the potential to increase PA while at school (Harrison et al., 2006). Another school-based PA intervention program, Promoting Lifetime Activity for Youth (PLAY), was also found to be effective in increasing PA levels among fourth-, fifth-, and sixth-grade students (Ernst & Pangrazi, 1999).

## Overview of School-Based Nutrition Intervention Programs

School-based interventions have the potential to increase children's' FV consumption. Because fruits and vegetables are low-energy, nutrient dense foods, they contribute to satiety and can help decrease the consumption of high sodium snacks and energy-dense foods (Newby, 2009). One study found that children generally prefer foods with high fat and sugar content. After surveying 4- to 16-year-olds, results showed that sugary food was rated highest and vegetables were rated lowest in terms of likability (Cooke & Wardle, 2005). Schools are a logical setting for nutrition education because they offer many food amenities such as breakfast, lunch, and after-school care, which are all opportunities to create and emphasize dietary change (Latimer, 2009). In 2012, the US Department of Agriculture released new guidelines for school breakfasts and school lunches. These standards increased the number of FV servings and variety offered when serving these meals (US Department of Agriculture, 2012).

The Food Dudes program was an intervention based out of the UK that used peer-

modeling and rewards to influence children's food choices. The peer modeling component of Food Dudes focused on a group of fictional peers who are depicted eating and praising the virtues of fruits and vegetables. The fictional 'Food Dudes' were created to counter and offset the messaging in popular culture that influences children to eat unhealthy food. Daily rewards such as stickers and pencils were awarded to children as incentives for consuming a given amount of fruits and vegetables each day. The Food Dudes program produced significant and long-term increases in fruit and vegetable intake among elementary-aged children (Horne et al., 2009). Another study in the US used the Food Dudes intervention and found that FV consumption significantly increased (.49 cups/day) during and after the intervention (Wengreen, Madden, Aguilar, Smits, & Jones, 2013).

Another study by Hoffman, Franko, Thompson, Power, and Stallings (2010) used videos produced by a fruit company and tangible rewards as a way to increase FV consumption while children are at school. Results showed that FV consumption increased significantly in the 1st year of the study but the 2nd year of the intervention did not find a significant increase. An 18-month intervention designed to modify the school environment to prevent excess weight gain by making healthier eating choices and physical activity opportunities more available for African-American sixth-grade children helped decrease their percent of kilocalories consumed from unsaturated and saturated fat, while increasing carbohydrate intake and PA during the intervention (Newton et al., 2010).

A study using peer modeling and gamification strategies was conducted among 180 kindergarten- to eighth-grade students in the US. A game display was made from

poster board along with icons for the game. Each day, students were given a FV consumption goal and if they achieved the goal, a new episode of the game would be revealed. Each episode described the adventures of heroic characters as they went after villains. If students did not reach their goal, no new episode was read to them (Jones, Madden, Wengreen, Aguilar, & Desjardins, 2014). Results from the study indicated that fruit consumption increased by 66% ($p < .01$) and vegetable consumption increased by 44% ($p < .05$) per day when measured in cups. Parents also reported on a survey that their children were consuming more FV at home and were more willing to try new FV after the intervention had taken place (Jones et al., 2014).

Children's liking for FV has been shown to be the most significant predictor for their consumption (Gibson, Wardle, & Watts, 1998). Exposure to unfamiliar FV is one strategy for increasing children acceptance of new foods (Wardle, Herrera, Cooke, & Gibson, 2003). One study introduced red peppers to children at school for 2 weeks. This daily exposure to a vegetable increased the children's liking and consumption (Wardle et al., 2003). Providing opportunities to taste food has more impact on increasing children's food preferences then telling them it is beneficial for their health (Pliner & Loewen, 1997). Taylor, Yon, and Johnson (2014) used the digital imaging along with plate waste method as a way measure children's' FV consumption while at school. Plates were weighed to the nearest gram before children ate lunch and again afterwards. Pictures of each child's plate were also taken before and after lunch. This technique determined the amount of FV consumption of each student during the school day.

The Children's Health, Activity, and Nutrition: Get Educated (CHANGE!) intervention was designed to promote both PA, nutrition, and healthy weight. A total of

318 primary school children in the UK participated in 20 weekly lessons, including worksheets, homework tasks, lesson resources, and a CD-ROM. These lessons allowed students to explore and understand living a healthy lifestyle through PA and nutrition (Fairclough et al., 2013). Researchers found a significant difference in waist circumference between the intervention school and the control school at postintervention (-1.63 cm). Results also showed a significant difference in BMI z-score at follow-up (-0.24) thus, there was a positive effect on body size outcomes following the CHANGE! Intervention (Fairclough et al., 2013).

Marathon Kids® is an organization that promotes walking, running, and FV consumption in children and their families. The fundamental program is centered on a 6-month intervention for elementary-aged children and their families. The goal is to have each child walk or run 26.2 miles within 6 months and eat 5 FV each day for 1 month. The children who reach these goals receive a t-shirt and a medal. A study by Springer et al. (2012) used Marathon Kids® as an intervention in an elementary school in Texas. Their results showed that students in the intervention engaged in higher mean times of running and FV consumption. Marathon Kids® also increased students' self-efficacy and their athletic identity self-concept.

School-based health promotion has the potential to have long-term benefits to children's health. A study in Germany used the Kiel Obesity Prevention Study (KOPS) to evaluate the feasibility of a 4-year outcome of school-based health promotion (Danielzik, Pust, & Muller, 2007). The KOPS had a few key messages: (a) eat fruit and vegetables every day, (b) reduce intake of high fat foods, (c) keep active for at least 1 hour, and (d) decrease screen time to less than 1 hour per day. These messages were given to students

through courses on nutrition and 20-minute activity breaks. The researchers found that the intervention had long-term effects on overweight girls but not on overweight boys (Danielzik, 2006).

## Goal Setting Among Elementary-Aged Children

The first scientific approach to goal setting was developed in the early 1900s by Fredrick W. Taylor. He conducted a study using blue collar workers and assigned them daily goals or tasks. Workers were given daily feedback on their work quality and whether they attained their assigned task (Locke, 1980). Goal setting does not have to be a part of a wider management system to be effective. It can also be used with single individuals or a group of individuals. In order to set meaningful goals, they should be specific (e.g., Reduce screen time by 10%) and challenging, which means difficult yet attainable (Locke, 1980). In 1981, George T. Doran wrote an acronym for goal setting called S.M.A.R.T. This acronym gives a guide to how successful goals should be written; specific, measurable, attainable, realistic, and time-bound. The criterion for a specific goal should include what's expected, who's involved, why it's important, etc. Measurable criterion should contain answers that are measureable such as how much, how many, how often, etc. If a goal is not measureable, it is not possible to know whether or not someone is making progress. Attainable criterion stresses the importance of goals being realistic and attainable. This should answer the question of how: how can the goal be accomplished, how realistic is the goal, etc. The fourth criterion, realistic, refers to choosing goals that are realistic and important to the person (s). Lastly, time-bound stresses the importance of grounding goals within a time-frame, giving them a target date.

A time-bound goal will usually answer the question when?, what can I do in 1 week from now?, etc. (Doran, 1981).

Goal setting has been a strategy used for increasing task performance for many years (Locke & Latham, 1990). Goals have the capacity increase the salience and value of competent performance, promote task involvement, instill challenge, and provide immediate, ongoing feedback (Bandura, 1986). For example, Bandura and Schunk (1981) found children accomplishing proximal goals on a math activity perceived themselves as more competent than children not pursuing goals. They also demonstrated more interest in the previously unenjoyable task. Task involvement represents the degree to which an individual becomes absorbed in an activity (Geen, 1980). One study suggested that goals may actually help individuals stay focused on a task, which can lead them to discover the enjoyable aspects of the activity (Locke & Latham, 1990). Other studies have found significant positive relationships task involvement and task interest (Bryan & Locke, 1967; Harackiewicz et al., 1987; Sanson, Sachau, & Wier, 1989). Both competence and task involvement embody two motivational processes through which individuals can become more involved in an activity. Once perceived competence and task involvement have been established, individuals may be more committed to the activity and intrinsic motivation my increase (Elliot & Harackiewicz, 1994). One study found that in the case of nutrition and PA, goal attainment was synonymous with behavior change (Shilts, Horowitz, & Townsend, 2004). However, if a person is not committed to a goal or activity, there will be no goal effect and consequently, no behavior change (Locke & Latham, 1990).

## Students' Perspective Towards School-Based Physical Activity Interventions

The previous sections review literature on school-based physical activity intervention programs, on school-based nutrition intervention programs, and on goal setting among. This section reviews literature on students' perspectives toward school-based physical activity interventions.

Most of the literature on school-based PA intervention perspectives are through the teacher's eyes. Although there is some literature that focuses on student's perspectives about PA and PE, little is known about their perspectives on school-based interventions. One study conducted in Auckland, New Zealand aimed to understand what responsibility of children's PA meant to teachers, parents, and children (Cox, Schofield, & Kolt, 2010). When children were asked about personal responsibility they generally had more to say about it than parents and teachers did. Children gave a variety of in-depth behaviors and traits associated with being responsible for their own PA. One theme that emerged out of the child interviews was self-management, which they define as "being active without having to be told by others" (p. 49). A second theme that emerged was avoiding obesity through PA and nutrition. Students who were interviewed stated "If you just sit around, you will get fat and unfit, and then you'll go out and get hurt and you won't be able to do any more" (p. 49). Another female student suggested "You can't eat bad foods and do running and stuff, you have to eat good foods and do fitness at the same time" (p. 49). When the researchers asked about dealing with the environment, one male student brought up a barrier when he stated "Because it is a hot day and there is lots of sun, you can't play outside for too long, and the sun is making you hot, you will want to

come in" (p. 50).

The primary reason for children wanting to be physically active is fun. If an activity is fun, youth are more likely to have intrinsic motivation and stick with that activity. Parents can sometimes diminish this intrinsic motivation when they place winning over fun. When asked about instrumental support, one female student told a story about her friend's parents "She came second in cross country and she always came first in most things, and her mum said, 'Helen, you should have come first' and all that stuff and she started crying. Her parents just can't say that" (Lewis, Fraser, & Manby, 2014, p. 1129). Having fun while being physically active can also be diminished when autonomy is taken away from children. One female student touched on this when she said "They are always telling me to do it (PA), and I don't want to, but then I have to" (p. 1129). Giving children a choice in activities encourages them to be physically active in different ways and at different times. This gives them a sense of control over their own PA. Children find that being able to choose which activities they want to take part in is important to them (Lewis, Fraser, & Manby, 2014). Many students feel as though parents should help them be physically active by encouraging them and setting an example by being physically active themselves (Cox et al., 2010). Children in this study also thought that eating the right foods was important for keeping up energy while being active and playing sports.

A different qualitative study by Tinning and Fitzclarance (1992) asked the question to children "Is it worth it?" referring to participating in PA. The intervention included having children participate in community physical activities for a total of 48-weeks. Results showed that participants really enjoyed the activities and felt fitter. One

participate said “It’s fun, energetic, it tires you out, and it’s healthy” (p. 1221). Another participant pointed out that they enjoyed coming to the activities, the intervention made them happy, and they made a lot of new friends (Lewis et al., 2014). Children in the intervention had a tendency to do more physical activity at home with their family and they felt happier afterwards. This demonstrates that children are gaining positive experiences in taking part in physical activities (Lewis et al., 2014). One avenue that children participate in PA is while they are at school in PE. Although student attitudes vary toward PE, the majority of students like the subject. PE often includes a substantial component of active play, which holds a powerful attraction to young people (Tinning & Fitzclarance, 1992). One study found that most male and female seventh-grade students would choose to take PE if it were optional (males 90%, females 66%) (Benedict, 2010). Those students who generally do not like PE feel as though they have low competence in sport skills and active skills. The majority of these students feel as though they would enjoy PE more if they were better at sports. Some of them feel that if they were better at sports, they would be more willing to participate (Carlson, 1995). This is why it is vital that school-based PA interventions focus on activities not only associated with sport, but also with lifelong physical activities.

## Conclusion

After reviewing past literature based on youth PA and FV consumption, numerous gaps in the literature became apparent. Firstly, while the aforesaid research suggests that school-based interventions have the ability to increase PA or FV consumption, it is not known if an intervention that is theory driven can increase MVPA and FV consumption

simultaneously among children in the US. Although results from previous research have been promising in reporting that interventions increase PA, there is insufficient evidence on the effectiveness of the use of activity monitors to determine changes in MVPA and questionnaires regarding FV consumption among children in the US. Second, the current literature reviewed suggests there is a need for interventions that target PA and FV consumption amongst underserved populations. Third, because having fun is the number one reason why children participate in PA, it is essential for school-based interventions to allow for student engagement among those who are participating.

# CHAPTER 3

# STUDY 1: THE EFFECTS OF CHARACTER PEER MODELING AND GOAL SETTING ON THIRD- TO FIFTH-GRADE CHILDRENS' PHYSICAL ACTIVITY AND ENJOYMENT

## Introduction

The prevalence of obesity among children in the United States (US) has tripled since the 1970s (Paxson, Donahue, Orleans, & Grisso, 2006). Developmentally, the elementary school years are a time when peers and peer influences become extremely important to children (Santrock, 2001). Peers have the ability to influence decisions made by children starting around the age of 10 (American Psychological Association, 2002). Children's choice to be physically active is influenced by their peers and their social environment (Hsu et al., 2011). Several cross-sectional studies indicate that children tend to be more physically active when surrounded by peer support, encouragement, group physical activity programs, and peer modeling (Davidson & Schmalz, 2006; Duncan, Duncan, & Strycker, 2005; Hohepa, Scragg, Schofield, Kolt, & Schaaf, 2007; Jago et al., 2009; Sallis, Taylor, Dowda, Freedson, & Pate, 2004; Schofield, Mummery, Schofield, & Hopkins, 2007).

Enjoyment has also been shown to be a factor in PA participation in children and may influence behavior and have an indirect effect on PA (Dishman, Motl, & Saunders,

2005). Studies have found that enjoyment increases motivation to participate in PA (McKenzie, Sallis, Kolody, & Faucett, 1997). However, the majority of research on enjoyment is much more evident in sport-based settings and therefore, greater insight into PA enjoyment during school is warranted.

Previous research has been conducted using school-based interventions in elementary-aged children. Fit 'n' Fun Dudes was an intervention in the UK with a promising approach to increasing activity levels in children by using peer modeling, rewards, and pedometers (Hardman, Horne, & Lowe, 2011; Horne, Hardman, Lowe, & Rowlands, 2009). The intervention was based on the Food Dudes program, which used peer modeling and rewards to influence children's food choices. The peer modeling component of Food Dudes focused on a group of fictional peers who are depicted eating and praising the virtues of fruits and vegetables. The fictional 'Food Dudes' were created to counter and offset the messaging in popular culture that influences children to eat unhealthy food. Daily rewards such as stickers and pencils were awarded to children as incentives for consuming a given amount of fruits and vegetables each day. The Food Dudes program produced significant and long-term increases in fruit and vegetable intake among elementary-aged children (Horne et al., 2009).

The concept of Food Dudes was adapted for PA in the Fit 'n' Fun Dudes (Horne et al., 2009). This 8-day intervention consisted of a song, Fit 'n' Fun Dudes personalized letters containing encouragement to be physically active, and posters of fictional characters who were presented as physically active children. The fictional characters were theorized to act as positive physical activity and active lifestyle role models for the children in the school. The efficacy of this 8-day intervention was examined by

comparing children's physical activity (step counts) in a rewards intervention group to a non-rewards-intervention group. The rewards intervention group was provided with peer modeling materials, pedometers to wear, and set daily pedometer target goals to reach in order to obtain rewards.

Horne et al. (2009) found that girls in the experimental school took significantly more steps during both the intervention and follow-up phases compared to girls in the control group. Boys in the experimental group also took significantly more steps during the intervention phase when compared to boys in the control group, but there was no significant difference between the groups in the follow-up phase.

A second study using the Fit 'n' Fun Dudes was conducted by Hardman et al. in 2011. The purpose of this study was to examine the effects of rewards, peer modeling, and pedometer targets on children's PA. Researchers used Fit 'n' Fun Dudes materials along with tangible rewards to conduct a 12-day school-based intervention. In the full intervention school, rewards such as balls, Frisbees, and erasers were given to students who reached or exceeded their pedometer target goal each day. Students in the non-rewards-intervention school received the same materials and daily pedometer targets, but were not offered rewards. In place of rewards, they received verbal praise (e.g., Well done, you have passed your target goal.) for reaching their pedometer target goal each day.

This particular study found a significant difference in overall levels of PA among students in the intervention school. The study also found that the full intervention group had a significant change in step counts over time and had significantly higher step counts than the non-rewards group and the control group during the intervention phase. During

the taper phase, children's step counts in the full intervention group were not significantly different from baseline. The non-reward intervention also had a significant change in step counts over time and continued to increase their step counts throughout the taper phase.

These findings, while somewhat paradoxical, are not entirely surprising. Research has shown that rewards can weaken an individual's intrinsic motivation to participate in a task (Ryan & Deci, 2000). Deci, Koestner, and Ryan (1999) also conclude that rewards can be seen as controlling which reduces the feeling of autonomy and undermines intrinsic motivation.

Despite promising initial findings, the Fit 'n' Fun Dudes has been phased out and is no longer used. One limitation of Fit 'n' Fun Dudes and other school-based interventions is the short duration of these interventions. Another limitation of this intervention and others is the lack of research regarding MVPA and PA enjoyment among elementary-aged children. This provides a need for more information regarding MVPA and PA enjoyment during elementary school-based interventions.

Study 1 extended previous research in important ways. First, while the aforementioned research suggests that Fit 'n' Fun Dudes increases PA, it was not known if an intervention of this nature increased MVPA. Second, little was known about PA enjoyment in elementary-aged children. Because previous research has found that interventions using peer modeling materials, pedometers, and daily pedometer goals have a significant effect on children's PA regardless of rewards (Hardman, Horne, & Lowe, 2011), study 1 focused on the effects a school-based intervention using peer-modeling materials, accelerometers, and daily accelerometer goals had on step counts, MVPA, and enjoyment of PA.

Although results from previous research have been promising in reporting interventions increasing PA, there is insufficient evidence on the effectiveness of the use of activity monitors to determine changes in MVPA and questionnaires regarding enjoyment of PA among children in the U.S. Additional research using these materials with school-based PA interventions are necessary in elementary-aged children. Therefore, the purpose of this study was to examine the impact of a school-based intervention on PA intensity and enjoyment of PA in third- to fifth-grade elementary-aged children at two urban elementary schools in the Mountain West United States.

The current study addressed the following research questions: (1) Does the Fit 'n' Cool Kids intervention increase MVPA and step counts among elementary-aged children? (2) Does the Fit 'n' Cool Kids intervention increase enjoyment of PA among elementary students? Based on previous research and theory, it was hypothesized that a school-based intervention that includes peer modeling and goal setting would increase MVPA and step counts among third- to fifth-grade-school-aged children and increase their enjoyment of PA.

## Methods

### Participants and Setting

The study participants were 112 students in grades 3-5 from two elementary schools in the Mountain West of the US. This age group was chosen because pre-adolescents are at high risk for obesity development (Alberga, Sigal, Goldfield, Prud' Homme, & Kenny, 2012; Wardle, Henning, Brodersen, Jarvis, & Boniface, 2006). Two schools were randomly assigned to one of the following conditions: (1) intervention or

(2) control. 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.

Approval from the University's Institutional Review Board was obtained prior to beginning the study. Child assent and parental consent letters were sent home with the children prior to the study beginning.

Physical Activity

Piezoelectric activity monitors (New Lifestyles NL-1000) were used to assess number of steps taken and the number of minutes in MVPA by the participants. The NL-1000 has been previously validated in elementary-aged children (Hart, Brusseau, Hodges Kulinna, McClain, & Tudor-Locke, 2011) and measures step counts and time spent in MVPA. Piezoelectric activity monitors were chosen for this study because although pedometer step-count feedback has shown to have a significant effect on children's PA (Duncan, Birch, & Woodfield, 2012), one major element lacking is their inability to provide an estimate of MVPA.

An MVPA intensity level of 3.0- 9.0 Metabolic Equivalents (METs) was set based on previous research with this age group (Claire, Hsiao, Tracy, & Gortmaker, 2013; Hart et al., 2011; McClain, Sisson, Washington, Craig, & Tudor-Locke, 2007). Students practiced wearing the activity monitors prior to the study beginning; each monitor case was unsealed so that participants could open it at any point during the intervention and monitor their progress.

Enjoyment of Physical Activity

Student's enjoyment was assessed using a single-item measure called the Funometer shown in Figure 3.1 Participants marked their level of enjoyment on a thermometer figure portrayed on paper at the end of 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. If a student colored between two tallies, then the tally will be rounded up or down to the nearest whole number. This instrument has previously been validated in elementary- and middle-school-aged children at youth sport camps (Belnap, 2009; Lee, 2008; Ralston et al., 2006).

Anthropometrics

Height was measured in cm using a SECA 213 stadiometer (Chino, CA, USA); weight was measured in kg using a Tanita HD-314 electronic scale (Arlington Heights, IL, USA). Sitting height was also taken for each participant to control for maturation effects (Mirwald, Baxter-Jones, Bailey, & Beunen, 2002). Each participant's body mass index (BMI) was calculated using a weight (kg)/(height (cm) x height (cm))formula.

## Materials

### *Fit 'n' Cool Kids Peer Modeling Materials*

Teachers at the intervention school were provided with a series of letters from the Fit 'n' Cool Kids that were read at the beginning of the day. These letters encouraged students to be physically active and included ideas on how to incorporate PA into their daily routine. The letters discussed the natural benefits of being physically active and included an 'Activity of the Day' section that promoted a different activity to be carried out on each day of the intervention such as walking to school.

## Study Procedures

### *Data Collection*

Data collection took place during the spring semester of 2014. Activity monitors were distributed to the students at the beginning of each day and were collected at the end of the day by their classroom teachers.

### *Baseline*

Anthropometric measures were taken during PE class by the PE teachers. They were trained to take accurate measures and used the same equipment in the intervention school and control school. 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 throughout 4 school days. Research indicates that 3 days of measurement are necessary to acquire a reliable estimate of children's habitual PA (Ozboda, Corbin, & Le Masurier, 2004). No feedback was given to the students during

the duration of baseline data collection.

*Intervention*

The intervention phase was 16 school days (4 weeks). Activity monitor step target goals were computed based on each individual student'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 10,500 steps during the baseline phase, their new target step count goal was 11,500). If students easily reached their goal, it was increased from week to week; if students struggled to meet their goal, it was adjusted to increase attainability and competence.

Students were introduced to the Fit 'n' Cool Kids on day 1 of the intervention. Day 1 involved teachers reading a letter from the Fit 'n' Cool Kids and introducing the program. Colorful Fit 'n' Cool Kids posters were displayed around the schools. Each student received a letter from the Fit 'n' Cool Kids with his or her step target goal and was instructed to 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 verbal praise the next morning. Children who did not reach their activity monitor step count goal were encouraged to keep trying.

There was no intervention in the control school and step counts and MVPA were recorded as they were during baseline data collection.

*Follow-Up*

A postintervention follow-up was conducted 6 school weeks after the intervention had ended. This timeline is consistent with previous research conducting follow-up testing (Duncan & Staples, 2010; Ridgers et al., 2007; Stratton et al., 2000; Stratton & Mullen, 2005). Students were instructed to wear their activity monitors for the entire school day. PA and MVPA were recorded during 4 school days to determine the sustained impact of Fit 'n' Cool Kids.

## Data Analysis

Baseline descriptive statistics were calculated for all dependent variables and one-way ANOVAs were conducted on each variable to determine the presence of any group differences. For each participant, activity monitor data were examined to determine the mean and standard deviation for step counts and minutes spent in MVPA during baseline, intervention, and follow up phases.

A 2 (intervention, follow-up) x 2 (experimental, control) factorial ANCOVA was used to analyze time and group effects on physical activity with baseline as the covariate. A 2 (intervention, follow-up) x 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 statistical tests.

# Results

A total of 112 students were initially recruited for the study and 95 students responded to participate. Demographic and baseline data included these 95 participants

while the intervention and follow-up analysis included 51 participants. To be included in the intervention and follow-up analysis, participants needed to have at least 3 complete days of activity monitor data during each week of the intervention phase and at least 3 days of data during the follow-up phase. The final sample sizes for inclusion in the analysis were 26 students from the intervention school and 28 students from the control school. The most frequent reasons for participant exclusion were missing data points due to losing or resetting of activity monitors, forgetting to wear activity monitors, absence from school, and fieldtrips. Outlier cases were also eliminated from the final sample. Validity was checked by having participants fill out a previous day activity questionnaire.

Baseline characteristics of the sample included in the analysis are shown in Table 3.1. Results showed no significant difference between the control school and intervention school at baseline $F_{(1,93)} = 3.76$, ($p > .05$). The analysis showed a significant difference in step counts between schools during the intervention phase $F_{(1,50)} = 5.475$, ($p = .023$) and the follow-up phase $F_{(1,50)} = 9.98$, ($p = .003$). Results also showed a significant difference in MVPA between schools during the intervention phase $F_{(1,50)} = 5.00$, ($p = .030$) and follow-up phase $F_{(1,50)} = 8.726$, ($p = .005$). Table 3.2 represents the mean steps and MVPA during baseline, intervention, and follow-up phases for each school.

No significant difference in enjoyment was detected between baseline, intervention, and follow-up $F_{(1,46)} = .913$, ($p > .05$). Table 3.3 represents the means for enjoyment during baseline, intervention, and follow-up phases for gender, BMI, and grade.

Students' MVPA

As projected, students in the intervention school significantly increased their MVPA while being exposed to Fit 'n' Cool Kids. Students also significantly increased their MVPA during the 6-school-week follow-up phase. These findings are similar to findings in a recent study where researchers used a 7-week school-based intervention to increase participants MVPA. They found that those who were in the intervention group significantly increased their PA during the intervention (Winner, 2013). Another study used a school-based intervention focused on having students reach 150 minutes of MVPA each week by promoting PA in PE, during recess and in the classroom. Results showed students who were in the intervention school increased their MVPA significantly more than students in the control school (Cradock et al., 2013). The findings from the current study do contradict findings from a study by Kipping et al. (2014) in which a 16-lesson intervention was designed to increase PA, decrease sedentary behavior, and increase fruit and vegetables in children, did not find a difference in MVPA between their intervention group and control group. Our findings suggest that peer modeling and goal setting are effective at increasing children's MVPA.

Students' Step Counts

It was hypothesized that peer modeling and goal setting would increase students' step counts. Results indicated that students in the intervention group significantly increased their step counts during the intervention and during the 7-week follow-up. This is in support of other studies, where children in a school-based intervention increased their step counts (Sigmund, Ansari, & Simundova, 2012; Vander, McGavock, Maximova,

& Veugelers, 2014).

## Enjoyment

As for enjoyment, we asked the students in the intervention group how much fun they had while being physically active during baseline, intervention, and follow-up. Although our results did not find any significant differences in enjoyment among the three phases, we did see an increase in enjoyment during all three phases. This is important to note due to research suggesting that children participate in PA for fun and enjoyment (Jago et al., 2009); therefore, preserving enjoyment within school-based interventions is imperative. We hypothesized that the school-based intervention would increase student's enjoyment of PA. This may be due to student's PA enjoyment already being high during baseline of the study (8.73 ± 2.19). Our results parallel another study where no significant change in enjoyment was found in children with high baseline enjoyment during an intervention targeted to increase enjoyment (Schneider & Cooper, 2011). This study also suggested that children with a high enjoyment levels at baseline do not significantly change their enjoyment levels through interventions.

# Discussion

The purpose of this study was to examine the impact of a school-based intervention on PA intensity and enjoyment of PA in third- to fifth-grade elementary-aged children. In the intervention school, students were exposed to the Fit 'n' Cool Kids materials and were given daily accelerometer targets to reach. Overall, students in the intervention school were significantly more active than students in the control school

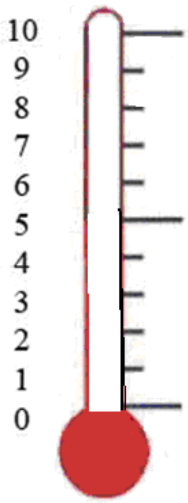
during the intervention phase and at follow-up. These findings are comparable to other findings related to peer modeling and goal setting (Hardman et al., 2009; Hardman et al., 2011).

A theoretical interpretation of the intervention and its findings is provided by Self Determination Theory (SDT). This theory aims to explain the interpersonal and environmental conditions that effect human motivation (Deci & Ryan, 1985). 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 (Murcia, Coll, & Perez, 2009). The intervention was also intended to increase participants' perceived competence by encouraging students to increase their step counts each week. Each student was given a separate goal that was challenging yet attainable. The aim here was to help students achieve their step count goal and experience a feeling of success and competence during PA. SDT also emphasizes the need for relatedness (a sense of belonging and feeling connected with others) for motivation (Ryan & Deci, 2007). The Fit 'n' Cool Kid characters were used as peer models and were intended to influence behavior and promote relatedness among the students. Previous studies have indicated that peer modeling can have an influence on children's behavior (Romero, Epstein, & Salvy, 2009).

Strengths of the study include the objective measures of physical activity using activity monitors; this is significant given the known limitations of using self-report

instruments with children (Welk, Corbin, & Dale, 2000). Other strengths involved the use of MVPA as a measure of PA, which adds to the literature in our field.

A limitation to the study was related to the number of cases that were not used due to missing data. Students losing, accidentally resetting the monitors and 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. One possible strategy to improve compliance in the future would be to use mean substitution as an imputation method for missing data. 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 physical activity during the intervention and follow-up phase; however, the long-term maintenance of this behavior is an important issue that should be examined further. The transtheoretical model identifies maintenance as a period beginning 6 months after the initiation of the target behavior (Prochaska et al., 1994, p. 40). A follow-up of 6 months succeeding the removal of the intervention could be established in other studies to determine if maintenance has occurred.




**Directions:** This diagram measures the amount of fun that you feel you had while participating in Fit 'n' Cool Kids. Please darken the thermometer to the level (1-10) that best describes your level of fun as it relates to Fit 'n' Cool Kids.

Figure 3.1 Funometer Questionnaire.

Table 3.1 Baseline Characteristics of the Included Sample.

| | Intervention School *(M ± SD)* | Control School *(M ± SD)* |
|---|---|---|
| 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 |

Table 3.2 Adjusted Means for Steps and MVPA at Baseline, Intervention, and Follow-Up

| School | Baseline *(M ± SE)* | Intervention *(M ± SE)* | Follow-up *(M ± SE)* |
|---|---|---|---|
| Control | | | |
| 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 | | | |
| 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 |

Note. † = statistically significant

Table 3.3 Means for Enjoyment at Baseline, Intervention, and Follow-Up

| | Baseline *(M ± SE)* | Intervention *(M ± SE)* | Follow-up *(M ± SE)* |
|---|---|---|---|
| Gender | | | |
| Boys | 9.21 ± 1.56 | 9.33 ± 1.40 | 9.38 ± 1.41 |
| Girls | 8.71 ± 2.10 | 9.50 ± 1.56 | 9.25 ± 1.62 |
| BMI | | | |
| Normal weight | 8.91 ± 1.93 | 9.23 ± 1.73 | 9.26 ± 1.65 |
| Overweight | 8.94 ± 1.86 | 9.75 ± 0.78 | 9.38 ± 1.26 |
| Grade | | | |
| Third | 9.71 ± 1.21 | 9.38 ± 1.56 | 9.46 ± 1.45 |
| Fourth | 9.05 ± 1.60 | 9.67 ± 1.32 | 9.57 ± 1.21 |
| Fifth | 8.94 ± 1.85 | 9.42 ± 1.48 | 8.78 ± 1.97 |

# CHAPTER 4

# STUDY 2: EFFECTS OF FIT 'N' COOL KIDS ON ELEMENTARY SCHOOL CHILDREN'S STEP COUNTS, MODERATE TO VIGOROUS PHYSICAL ACTIVITY, AND FRUIT AND VEGETABLE CONSUMPTION

## Introduction

It has been suggested that school-based interventions that combine PA and nutrition may be more beneficial for preventing children from becoming overweight than either increased PA alone or appropriate diet alone (Brown & Summerbell, 2009; Flodmark, Marcus, & Britton, 2006). School-based health promotion has the potential to have long-term benefits to children's well-being. The Active Program Promoting Lifestyle Education in Schools (APPLES) was an intervention that incorporated both nutrition and PA among elementary-aged children. APPLES consisted of teacher training, modifications in school meals, and the development and implementation of school action plans designed to promote PA and healthy eating over a 1-year period. Results showed a significant increase in vegetable consumption at the end of the intervention; however, no PA changes were seen between the intervention group and the control group (Sahota et al., 2001).

A separate 6-month nutrition education and PA intervention on Chilean primary

school children showed an effect on the physical fitness on boys and girls, and decreased adiposity in boys (Kain et al., 2004). Additionally, a combined dietary-physical activity intervention also leads to increased bone strength in obese children during the critical period of bone development of childhood and adolescence (Nemet, Berger-Shemesh, Wolach, & Eliakim, 2006). Although results from previous research have been promising in reporting interventions increasing PA and FV consumption, there is insufficient evidence on the effectiveness of the use of character peer modeling and goal setting on PA and FV consumption among children in the U.S.

Physical Activity and Physical Activity Intensity

Many school-based PA interventions focus on getting children moving more. A number of these interventions have been found to be effective in increasing students' PA in terms of daily in-school step counts (Hardman et al., 2011; Horne et al., 2009). For example, in one study, students who participated in an intervention including pedometer feedback and information about being PA accumulated more steps during the intervention compared to students in the control group (Butcher, Fairclough, Stratton, & Richardson, 2007). In another study, a model titled Action Schools! BC was implemented and boys in the Action Schools! BC intervention took significantly more steps than boys in the control group (Naylor, Macdonald, Warburton, Reed, & McKay, 2008).

According to Erikson's theory of psychosocial development (1959), personality develops through a series of stages and developing ego identity, which is the conscious sense of self developed through social interaction. Ego identity is thought to be constantly changing due to new experiences and information people acquire while interacting with

others. Developmentally, the elementary school years are a time when children are learning how to cope with new social demands and are identifying a sense of self through these interactions (Erikson, 1959). During these early school years, children who are encouraged and commended by teachers, peers, and parents develop a sense of competence and belief in themselves. Those who receive little or no encouragement from others tend to doubt their abilities (Erikson, 1959).

Adolescence is a time when peers and peer influences become extremely important to boys and girls (Santrock, 2001). Peers have the ability to influence decisions made by children starting around the age of 10 (American Psychological Association, 2002). Children's choice to be physically active is influenced by their peers and their social environment via encouragement, companionship, and modeling (Hsu et al., 2011; Sawka, McCormack, Nettel-Aguirre, Hawe, & Doyle-Baker, 2013). 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 (Davison & Schmalz, 2006; Duncan, Duncan, & Strycker, 2005; Hardman et al., 2011; Hohepa, Scragg, Schofield, Kolt, & Schaaf, 2007; Jago et al., 2009; Sallis, Taylor, Dowda, Freedson, & Pate, 2004; Schofield, Mummery, Schofield, & Hopkins, 2007).

Although both boys and girls use peer support as motivating factor to participate in PA, many studies have cited activity level differences between boys and girls indicating that boys are more active at school compared to girls (Fang Yan, Voorhees, Beck & Qi Wang, 2014). One study showed that boys ages 10-12 spent significantly more time in MVPA per day than girls of the same age and girls were more likely to

participate in sedentary activity (Ahamed et al., 2007). Another study that took place in the US concluded that boys exhibited significantly greater participation in MVPA than girls in grades 4-12 (Trost et al., 2002). PA levels among girls' decline by 45% between the ages of 12-17, which is nearly twice the amount compared to boys (Dishman, Saunders, Motl, Dowda, & Pate, 2009). Girls are less active than boys at all ages. The greatest decline in PA among girls appears to be during early adolescence (Elder et al., 2007).

This difference in PA is partly due to boys and girls having different motivations for being physically active and as they become adolescents, their activity interests differ. Girls participate in PA for weight management and for the social scene. Boys are drawn to PA for the competition, strength enhancement, and recognition (Stevens et al., 2005). Girls are also less likely to engage in vigorous PA and strengthening activities. Boys are more likely to engage in these activities and they are more likely to believe that benefits of PA outweigh the barriers (Vu, Murrie, Gonzalez, & Jobe, 2006). The Fit 'n' Cool Kids intervention is designed to appeal to both boys and girls by promoting motivation, enjoyment, competence, and self-determination (Lawman et al., 2011).

Fruit and Vegetable Consumption

It is suggested that children eat at least five servings of fruits and vegetables (FV) each day. A serving of fruit is equivalent to 1 cup (e.g., 1 small apple, 1 banana, 32 seedless grapes, 8 large strawberries) and a serving of vegetables is equivalent to 1 cup as well (e.g., 12 baby carrots, 1 large ear of corn, 1 medium potato, 3 long spears of broccoli) (United States Department of Agriculture, 2015). On average, children are

consuming much less than recommended. Only 20% of children ages 4-13 are eating the recommended servings per day and FV consumption continues to decrease with age within childhood (Frazao, 1998; Guenther & Dodd, 2006). Promoting early childhood nutrition programs aimed at improving diet has the potential to enhance intellectual development and academic success in the early years of development (Brown & Pollit, 1996). Food habits are developed during childhood and adolescence, which makes it important to foster healthy eating behaviors such as eating fruits and vegetables at an early age (Ishdorj et al., 2013).

Most children obtain, on average, more than one third of their daily caloric intake from food consumed at school (Briefel, Wilson, & Gleason, 2009) and despite an increasing knowledge about health benefits of diets high in fruits and vegetables, school-aged children's diets are lacking in fruits and vegetables (Cole & Fox, 2008). School lunch rooms policies and practices have the opportunity to increase FV consumption among elementary children. A study by Ishborj et al. (2013) found that schools who implemented a fresh fruit and vegetable policy led to increased consumption of fruits, and children who attended schools that did not serve French fries increased their vegetable consumption. Results also showed school policies that focused on in school consumption of FV had an effect of "away from school" FV consumption.

Another study had parents take a survey regarding important concepts to be taught at school regarding healthy eating; five items were identified as important concepts: (1) importance of teaching benefits of healthy eating, (2) importance of teaching to accept different body types among students, (3) importance of teaching to eat plenty of fruits and vegetables, (4) importance of teaching children to eat a healthy breakfast, and (5)

importance of teaching how to select healthy choices from each food group (Murnan et al., 2006).

When lunchrooms make FV more appealing, it can increase the FV consumption among students (Hubbard et al., 2014; Perry et al., 1998). The "Smarter Lunchroom Makeover" is an intervention that introduced small changes such as convenience and attractiveness of healthy foods in school cafeterias to encourage children to make healthier choices. Hanks, Just, and Wansik (2012) conducted a field study using Smarter Lunchroom Makeover in seventh- to 12$^{th}$-grade students. During the study, researchers recorded tray waste for each student over a span of 12 days. The impact of the intervention was most evident in selection and consumption of FV. The Smarter Lunchroom Makeover increased fruit consumption by 18% and vegetable consumption by 25%.

In efforts to combine both PA and FV consumption into one intervention, this study examined whether Fit 'n' Cool Kids increases PA levels and FV consumption of children participating in the intervention compared to the control school; furthermore, it examined the difference in PA levels among boys and girls before and after Fit 'n' Cool Kids is implemented. The current study also aimed to examine the effects of unfamiliar FV exposure on FV consumption in students before and after Fit 'n' Cool Kids was implemented. Students' PA levels and FV consumption from baseline to end-intervention periods and follow-up of Fit 'n' Cool Kids were examined.

It was hypothesized that elementary school students would have significant increases in their in-school PA levels from baseline to end-intervention period and would be sustained and continue to increase through to the follow-up period. It was also

hypothesized that elementary school students would have significant increases in their in-school FV consumption from baseline to end-intervention period and the improvements would be sustained and continue to increase through the follow-up period. In addition, it was hypothesized that male and female elementary school students would have significant increases in their PA levels from baseline to the end-intervention period of Fit 'n' Cool Kids. It was also hypothesized that exposure to nonfamiliar FV would increase children's FV consumption from baseline to end-intervention period and the improvements would be sustained through the follow-up period.

It was assumed that elementary school students in this study would adhere to the instructions on the proper wearing of and not tampering with the instrument for measuring PA levels during the school day. In addition, it was assumed that students would participate with effort in reaching their target step count goals each day. It was expected that students would be truthful on the FV questionnaires. In addition, it was assumed that students would participate with effort in reaching their target FV consumption each day.

## Methods

### Participants and Setting

The study participants were 187 students in grades 4-5 from two Title 1 elementary schools in the Mountain West of the US. This age group was chosen because preadolescents are at high risk for obesity development (Alberga, Sigal, Goldfield, Prud' Homme, & Kenny, 2012; Wardle, Henning, Brodersen, Jarvis, & Boniface, 2006). Two schools in the Salt Lake City school district were randomly assigned to one of the

following conditions: (1) intervention or (2) control. Both schools were designated as 'Title 1' which meant that at least 40% of the students qualified for free or reduced lunch. The two schools also had similar lunch periods (length of lunch period) and similar lunch menus; however, one fourth-grade group had lunch before recess while the other grades had lunch after recess. Approval from the University's Institutional Review Board was obtained prior to beginning the study. Child assent and parental consent letters were sent home with the children prior to the study beginning.

Physical Activity Measures

Piezoelectric activity monitors (New Lifestyles NL-1000 and NL-2000) were used to assess number of steps taken and the number of minutes in MVPA by the participants. The New Lifestyles series has been previously validated in elementary-aged children (Hart, et al., 2011). Piezoelectric activity monitors were chosen for this study because although pedometer step-count feedback has shown to have a significant effect on children's PA (Duncan, Birch, & Woodfield, 2012), one major element lacking is their inability to provide an estimate of PA intensity. The New Lifestyles NL-1000 and NL-2000 were used in place of accelerometers because of cost and practicality.

An MVPA intensity level of 3.5-5.5 Metabolic Equivalents (METs) was set based on previous research with this age group (Ainsworth et al., 2000; Wang, Hsiao, Orleans, & Gortmaker, 2013; Wu, Cohen, Shi, Pearson, & Sturm, 2011). Students practiced wearing the activity monitors prior to the study beginning; each monitor case was unsealed so that participants could open it at any point during the intervention and monitor their progress.

Height was measured in cm using a SECA 213 stadiometer (Chino, CA, USA); weight was measured in kg using a Tanita HD-314 electronic scale (Arlington Heights, IL, USA). Sitting height was also be taken for each participant to control for maturation effects (Mirwald, Baxter-Jones, Bailey, & Beunen, 2002). Each participant's body mass index (BMI) was calculated using a weight (kg)/ (height ($m^2$) formula.

Fruit and Vegetable Consumption Measurement

Direct observation and a nutrition questionnaire were used to assess FV consumption by the participants. FV consumption was evaluated at the grade level. Direct observation has been validated in previous studies (Price & Just, 2015). The researcher and other trained graduate students monitored FV consumption in the cafeteria during each grade's lunch time. Observers counted the number of fruit and vegetable servings each grade took from the lunch line or the amount of servings they brought in a sack lunch from home. At the end of lunch, the researcher and graduate students stood at a designated garbage can and counted the amount of fruit and vegetable servings thrown away from each child. The difference between servings taken at lunch and servings thrown away at the end of lunch determined the total amount of FV consumption for each day.

In previous studies, multiple observers observed different children in the lunchroom in order to get an accurate count of FV consumption (Harrington, Kohler, McClure, & Franklin, 2009; Jones et al., 2013; Latimer, 2009; Wengreen, 2013). Therefore, multiple observers were used in this study to enhance interobserver reliability. To enhance agreement, the observers were given detailed definitions of serving sizes for

fruits and vegetables.

A modified version of a nutrition questionnaire previously used in elementary students was used to examine eating and drinking habits of the participants. The questionnaire was given during baseline, intervention, and follow-up week to students in the intervention school. See Appendix G for nutrition questionnaire.

For this study, potatoes or fruit juices were not considered a fruit or vegetable. While potatoes are technically considered to be a vegetable under USDA regulations, many potato sides served at school are in the form of French fries, or other processed foods. Fruit drinks were not considered given their increased sugar content.

## Data Collection and Study Procedures

Data collection took place during the 2015-2016 elementary school year. Height was measured in cm using a SECA 213 stadiometer (Chino, CA, USA); weight was measured in kg using a Tanita HD-314 electronic scale (Arlington Heights, IL, USA). Each participant's body mass index (BMI) was calculated using a weight (kg)/ (height ($m^2$) formula. Activity monitors were distributed to the students at the beginning of each day and were collected at the end of the day by their classroom teachers.

## Baseline

Anthropometric measures were taken during PE class by the PE teachers. They were trained to take accurate measures and used the same equipment in the intervention school and control school. 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 throughout 4 school days. Research indicates that 3 days of measurement is necessary to acquire a reliable estimate of children's habitual PA (Ozdoba, Corbin, & Le Masurier, 2004). Each grades' FV consumption was recorded throughout 4 school days during baseline. No feedback was given to the students during the duration of baseline data collection.

Intervention

The intervention phase was 16 school days (4 weeks). Four-week school-based interventions have been proven to be effective for behavior change in previous studies (Amaro et al., 2006; Hardman et al., 2011; Horne et al., 2009; James et al., 2004; Lazaar et al., 2007). Activity monitor step target goals was computed based on each individual student's baseline step-counts mean. The current study added 10% to children's step goal once per week (e.g., if a student moved 5,500 steps during the baseline phase, their new target step count goal would increase by 10% once/week). Previous research has shown that adding 10% to step goals once a week is sufficient for increasing daily step counts (Hardman et al., 2011; Horne et al., 2009). Students who reached their goal were given a mean step increase of 10% at the end of each week; those students who struggled to meet their goal were given a mean step reduction of 10% to increase attainability and competence. Students were also verbally reminded by the researcher and classroom teachers each day to monitor their progress and work towards their goal.

FV consumption target goals were computed based on each grades' baseline FV consumption mean. Setting goals at a grade level was chosen for the reason that observing FV consumption at a group level has been shown to be effective in previous

studies (Jones et al., 2014; Shilts, et al., 2004). Goal setting techniques followed the above protocol.

Students were introduced to the Fit 'n' Cool Kids on day one of the intervention. Day 1 involved teachers reading a letter from the Fit 'n' Cool Kids and introducing the program. An 'Activity of the day' and a 'Fruit and Vegetable of the Day' letter was also read to each class by their teacher at the beginning of each school day encouraging students to eat fruits and vegetables and participate in MVPA. Colorful Fit 'n' Cool Kids posters were displayed around the schools reminding students to be physically active and eat fruits and vegetables. Each student received an individualized letter from the Fit 'n' Cool Kids with his or her step target goal and was instructed to reach their goal as many days as possible during the intervention. Class time was provided for students to read their letters throughout the week. At the end of each day, step counts and MVPA were recorded and students were given verbal praise from the Fit 'n' Cool Kids via personal letters and personal goals were adjusted accordingly on designated days.

Each class also received a letter from the Fit 'n' Cool Kids with a grade FV consumption goal and was instructed to reach the goal as many days as possible during each week of the intervention. See Appendix A for the intervention introduction letter. See Appendix B for the 'Activity of the day' letter. See Appendix C for an example of the posters. See Appendix D for the week 1 goal setting letter. See Appendix E for weekly goal setting letters. See Appendix I for an example of the posters. See Appendix J for the week 1 goal setting letter. See Appendix K for weekly goal setting letters.

Follow-Up

A postintervention follow-up was conducted 10 weeks after the intervention ended. This timeline was consistent with previous research conducting follow-up testing (Duncan & Staples, 2010; Ridgers et al., 2007; Stratton & Mullen, 2005; Stratton et al., 2000). Students were instructed to wear their activity monitors for the entire school day. Step counts and MVPA were recorded during 4 school days to determine the sustained impact of Fit 'n' Cool Kids. A 'Previous Day Activity' validity sheet (Appendix F) was filled out by participants during baseline, intervention, and follow-up. Students were also instructed to fill out the modified nutrition questionnaire. FV consumption was recorded during lunch on 4 school days to determine the sustained impact of Fit 'n' Cool Kids.

Data Analysis

Baseline descriptive statistics were calculated for step counts, MVPA, and FV consumption and one-way ANOVAs were conducted on each variable to determine the presence of any group differences. For each participant, activity monitor data were examined to determine the mean and standard deviation for step counts and minutes spent in MVPA during baseline, intervention, and follow-up phases. To be included in PA analysis, each activity monitor need to have at least 3 complete days of activity monitor data each week of baseline, intervention, follow-up phase. Validity and outliers in the data were checked via "previous day activity" questionnaires and statistical tests (box and whisker plots). Assumptions of normality, homogeneity of variance, and sphericity were tested. For each grade, FV consumption data were analyzed to determine the mean and standard deviation for baseline, intervention, and follow-up phases.

A 2 (intervention, control) x 3 (baseline, intervention, follow-up) mixed-design ANOVA was used to analyze group differences in step counts and MVPA. A one-way MANOVA was run to analyze group differences in FV consumption. A Friedman test was run to determine if there were differences in FV consumption over time. An alpha level of 0.05 was set for all statistical tests.

## Results

A total of 200 students were initially recruited for the study and 187 students responded to participate. Demographic and baseline data included these 187 participants while the intervention analysis included 159 participants and follow-up analysis included 147 participants. To be included in the intervention and follow-up analysis, participants needed to have at least 3 complete days of activity monitor data during each week of the intervention phase and at least 3 days of data during the follow-up phase. The final sample sizes for inclusion in the analysis were 67 students from the intervention school and 92 students from the control school. The most frequent reasons for participant exclusion were missing data points due to losing or resetting of activity monitors, absence from school, and fieldtrips. Validity was checked by having participants fill out a previous day activity questionnaire.

Baseline characteristics of the sample included in the analysis are shown in Table 4.1.

Step Counts

Results showed no outliers, as assessed by boxplot. The data were normally distributed, as assessed by Shapiro-Wilk's test of normality ($p > .05$). There was homogeneity or variances ($p > .05$) and covariances as assessed by Levene's test of homogeneity of variances and Box's M test, respectively ($p = .430$). Mauchly's test of sphericity indicated that the assumption of sphericity was violated for the two-way interaction, $\chi^2$ (14) = 25.475, $p = .030$. Therefore, the degrees of freedom were adjusted in calculating the $p$ value using Greenhouse-Geisser. There was a statistically significant interaction between the intervention group and step counts over time, $F$ (4.250, 271.991) = 4.635, $p < .05$, partial η2 = .068, ε = .850. Results showed no significant difference between the control school and intervention school at baseline $F_{(1,186)} = 3.62$, ($p > .05$). Steps taken were statistically significantly greater in the intervention ($M = 5631.471$, $SE = 249.443$, $p < .05$) compared to the control group over time ($M = 3151.027$, $SE = 182.432$, $p < .05$). There was a statistically significant effect of time on step counts for the intervention group, $F$ (5, 110) = 4.082, $p = .002$, partial $\eta^2 = .157$. Table 4.2 represents the mean steps during baseline, intervention, and follow-up phases for each school.

Figure 4.1 illustrates the average steps taken during baseline, intervention, and follow up. There was an increase in average step counts take by the intervention school over time from baseline to follow up.

MVPA

There was a statistically significant interaction between the intervention group and MVPA over time, $F$ (4.222, 270.207) = 2.804, $p < .05$, partial η2 = .042, ε = .844.

Results showed no significant difference between the control school and intervention school at baseline $F_{(1,186)} = 3.86$, ($p > .05$). MVPA was statistically significantly greater in the intervention ($M = 20.43$, $SE = 0.990$, $p < .05$) compared to the control group over time ($M = 11.16$, $SE = 0.724$, $p < .05$). There was no statistically significant effect of time on MVPA for the intervention group, $F$ (5, 110) = 2.176, $p = .062$, partial $\eta^2 = .090$. Table 4.3 represents mean MVPA during baseline, intervention, and follow-up phases for each school.

Figure 4.2 illustrates the average time spent in MVPA during baseline, intervention, and follow-up. There was an increase in average time spent in MVPA by the intervention school over time from baseline to follow-up.

Results showed no significant difference in FV consumption between the control school and intervention school at baseline $F$ (1,186) = 1.84, ($p = .308$). FV consumption was not significantly greater in the intervention ($M = 51.25$, $SE = 12.311$, $p > .05$) compared to the control group over time ($M = 53.63$, $SE = 12.024$, $p > .05$). No significant interaction was found between the intervention group and FV consumption over time, $F$ (5, 10) = 2.265, p > .05, partial η2 = .531, ε = .266. There was no statistically significant effect of time on FV consumption for the intervention group, $F$ (5, 110) = 2.176, $p = .062$, partial $\eta^2 = .090$. Table 4.4 represents mean FV consumption during baseline, intervention, and follow-up phases for each school.

FV Consumption Questionnaire

A Friedman test was run to determine if there were differences in FV consumption during baseline, intervention, and follow-up. Pairwise comparisons were

performed with a Bonferroni correction for multiple comparisons. Students who filled out the FV consumption questionnaire reported significantly different FV consumption at different time points (baseline, intervention, and follow-up), $\chi^2$ (2) = 222.484, $p < .05$. Post hoc analysis revealed statistically significant differences in FV consumption from baseline (*Mdn* = 1.83) to intervention (*Mdn* = 3.54) ($p < .05$) and follow up (*Mdn* = 4.25) ($p < .05$).

## Discussion

The purpose of this study was to examine the impact of a school-based intervention on PA intensity and FV consumption in fourth- to sixth-grade elementary-aged children enrolled in an urban elementary school in the Mountain West U.S. Overall, students in the intervention school were significantly more active than students in the control school during the intervention phase and at follow-up. These findings are comparable to other findings related to peer modeling and goal setting (Hardman et al., 2009; Hardman et al., 2011).

### Students' Step Counts

It was hypothesized that peer modeling and goal setting would increase students' step counts. Results indicated that students in the intervention group significantly increased their step counts during the intervention and during the 10-week follow-up. This is in support of other studies, where children in a school-based intervention increased their step counts (Sigmund, Ansari, & Simundova, 2012; Vander, McGavock, Maximova, & Veugelers, 2014).

Students' MVPA

As projected, students in the intervention school significantly increased their MVPA while being exposed to Fit 'n' Cool Kids. Students also significantly increased their MVPA during the 10-school-week follow-up phase. These findings are similar to findings in a recent study where researchers used a 7-week school-based intervention to increase participants MVPA. They found that those who were in the intervention group significantly increased their PA during the intervention (Winner, 2013). Another study used a school-based intervention focused on having students reach 150 minutes of MVPA each week by promoting PA in PE, during recess and in the classroom. Results showed students who were in the intervention school increased their MVPA significantly more than students in the control school (Cradock et al., 2013). The findings from the current study do contradict findings from a study by Kipping et al. (2014) in which a 16-lesson intervention was designed to increase PA, decrease sedentary behavior, and increase fruit and vegetables in children, but did not find a difference in MVPA between their intervention group and control group. Our findings suggest that peer modeling and goal setting are effective at increasing children's MVPA.

FV Consumption

FV consumption by participants was measured in two ways: direct observation and a nutrition questionnaire. It was hypothesized that the Fit 'n' Cool Kids intervention would increase students' FV consumption and although FV consumption did not increase significantly during the intervention, students were introduced to multiple fruits and vegetables per day. It was hypothesized that the school-based intervention would increase

student's FV consumption. Failing to reject the null hypothesis may have been due to student's lunch period variances and how the fruits and vegetables were presented to the students.

The control school allowed the fourth-grade students to have recess before lunch which gave them a set time to eat in the lunch room. The fourth graders in the intervention school had lunch before recess and were not required to stay in the lunch room for a specific time before going out to recess. Through direct observation, the researcher and graduate students collecting data noted that the fourth graders in the intervention school spent much less time in the lunch room and were quick to dispose of their trays in order to get out to recess. This is consistent with previous research that suggests that when recess is before lunch, there is a reduction in food waste and an increase in FV consumption (Hunsberger et al., 2014; Price & Just, 2015). The fifth graders in both the control school and the intervention school had recess before lunch.

The researcher and graduate assistants directly observed what was being served each day for lunch. They found that when children were served whole apples and whole bananas, they were less likely to consume those foods. They directly observed children try to bite into an apple or peel a banana but give up before they could make progress and eat the piece of fruit. They also observed children eating more raw vegetables when compared to cooked vegetables.

A theoretical interpretation of the intervention and its findings is provided by Self Determination Theory (SDT). This theory aims to explain the interpersonal and environmental conditions that effect human motivation (Deci & Ryan, 1985). Throughout the intervention phase, efforts to maximize autonomy were made by allowing

students to choose when, where, and how they were physically active and what fruits and vegetables that ate. The intervention gave students ideas on how to be physically active as well as introduced new fruits and vegetables but ultimately, students were allowed to choose their avenue for PA and FV consumption. Giving the students a sense of autonomy was important because research has shown that it can lead to greater interest and satisfaction in activity (Murcia, Coll, & Perez, 2009). The intervention was also intended to increase participants' perceived competence by encouraging students to increase their step counts and FV consumption each week. Each student was given a separate goal PA and a group FV consumption goal that was challenging yet attainable. The aim here was to help students achieve their goals and experience a feeling of success and competence. SDT also emphasizes the need for relatedness (a sense of belonging and feeling connected with others) for motivation (Ryan & Deci, 2007). The Fit 'n' Cool Kid characters were used as peer models and were intended to influence behavior and promote relatedness among the students. Previous studies have indicated that peer modeling can have an influence on children's behavior (Romero, Epstein, & Salvy, 2009).

Strengths of the study include providing objective measures of physical activity using activity monitors; this is significant given the known limitations of using self-report instruments with children (Welk, Corbin, & Dale, 2000). Other strengths involved the intervention being theoretically driven, the use of MVPA as a measure of PA, the incorporation of PA and FV consumption in one intervention, studying underserved populations, creating an intervention that does not require much time from teachers or administration, and is low cost to school districts. These strengths add to the literature in

our field.

A limitation to the study was the different lunch procedures between fourth graders in the control school and the intervention school. Another limitation was due to the time between the end of the intervention and the beginning of the follow-up phase. Although the current study results showed an increase of physical activity during the intervention and follow-up phase, the long-term maintenance of this behavior is an important issue that should be examined further. The transtheoretical model identifies maintenance as a period beginning 6 months after the initiation of the target behavior (Prochaska et al., 1994, p. 40). A follow-up of 6 months succeeding the removal of the intervention could be established in other studies to determine if maintenance has occurred.

Table 4.1 Baseline Characteristics of the Included Sample ($N = 187$)

| | Control School *(M ± SD)* | Intervention School *(M ± SD)* |
|---|---|---|
| Standing Height | 1.39 ± .078 | 1.40 ± .073 |
| Weight | 39.07 ± 11.84 | 39.24 ± 10.61 |
| BMI | 19.74 ± 4.42 | 19.67 ± 4.19 |

Table 4.2 Adjusted Means for Steps at Baseline, Intervention, and Follow-Up

| School | Baseline *(M ± SE)* | Week 1 *(M ± SE)* | Week 2 *(M ± SE)* | Week 3 *(M ± SE)* | Week 4 *(M ± SE)* | Follow-up *(M ± SE)* |
|---|---|---|---|---|---|---|
| Control | | | | | | |
| Steps | 3307.85 ± 214.81 | 3039.68 ± 227.44 | 2284.16 ± 290.74 | 3197.89 ± 205.65 | 2308.37 ± 251.93 | 2915.51 ± 197.07 |
| Intervention | | | | | | |
| Steps | 3972.06 ± 275.33 | †5439.82 ± 293.17 | †6081.35 ± 290.74 | †6002.41 ± 251.87 | †6563.32 ± 311.44 | †6490.92 ± 248.35 |

Note. † = statistically significant

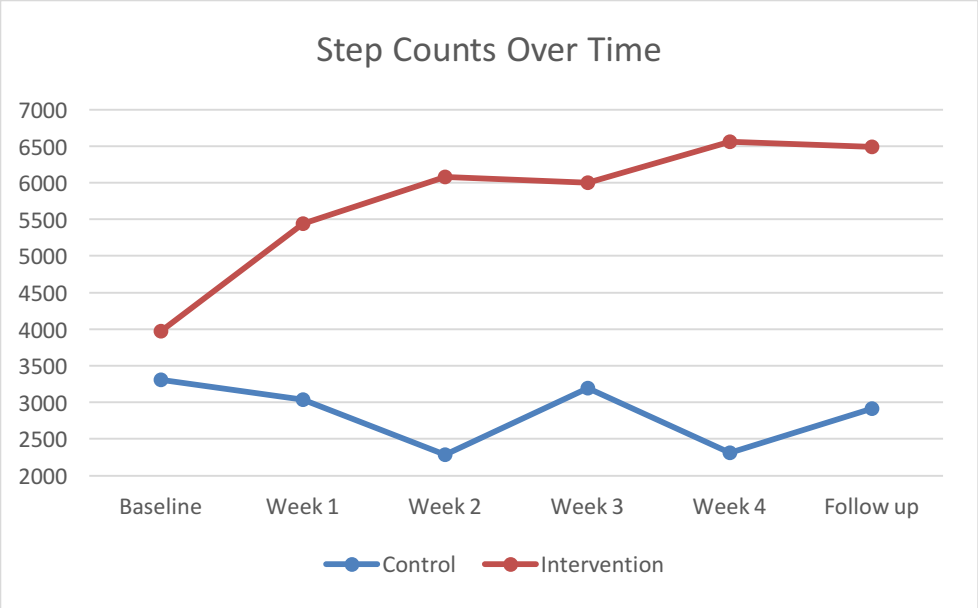



Figure 4.1: Average Steps Taken by Students in the Control and Intervention School During Baseline, Intervention, and Follow-Up.

Table 4.3 Adjusted Means for MVPA at Baseline, Intervention, and Follow-Up

| School | Baseline *(M ± SE)* | Week 1 *(M ± SE)* | Week 2 *(M ± SE)* | Week 3 *(M ± SE)* | Week 4 *(M ± SE)* | Follow-up *(M ± SE)* |
|---|---|---|---|---|---|---|
| Control MVPA | 12.84 ± 10.38 | 11.27 ± 9.28 | 10.65 ± 7.67 | 12.23 ± 7.13 | 8.77 ± 7.76 | 11.18 ± 7.89 |
| Intervention MVPA | 16.63 ± 11.89 | †21.50 ± 10.24 | †16.55 ± 7.04 | †22.82 ± 11.24 | †21.94 ± 10.69 | †23.13 ± 8.82 |

Note. † = statistically significant

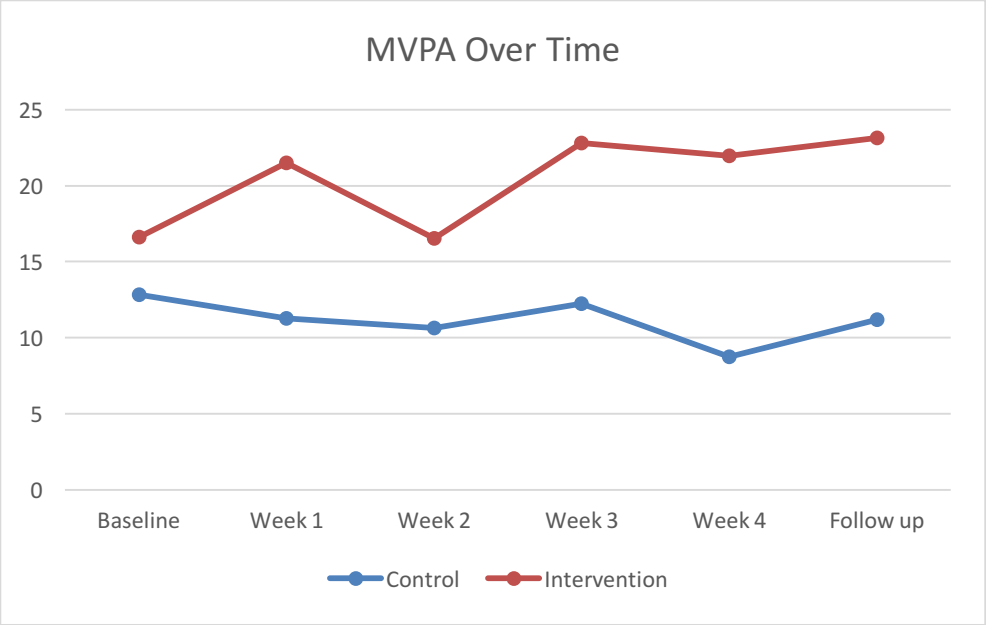



Figure 4.2: Average Time Spent in MVPA by Students in the Control and Intervention School During Baseline, Intervention, and Follow-Up.

Table 4.4 Adjusted Means for FV Consumption at Baseline, Intervention, and Follow-Up

| School | Baseline *(M ± SE)* | Week 1 *(M ± SE)* | Week 2 *(M ± SE)* | Week 3 *(M ± SE)* | Week 4 *(M ± SE)* | Follow-up *(M ± SE)* |
|---|---|---|---|---|---|---|
| Control FV Consumption | 45.80 ± 2.55 | 60.5 ± 2.12 | 47.0 ± 2.83 | 53.63 ± 0.53 | 51.25 ± 6.72 | 50.0 ± 7.07 |
| Intervention FV Consumption | 50.93 ± 4.70 | 49.60 ± 18.50 | 59.50 ± 25.46 | 53.50 ± 24.04 | 59.25 ± 23.69 | 60.0 ± 21.21 |

# CHAPTER 5

# STUDY 3: ELEMENTARY SCHOOL STUDENT'S EXPERIENCES PARTICIPATING IN THE FIT 'N' COOL KIDS INTERVENTION

## Introduction

Because there is a belief that children's lifestyle behaviors are likely to be sustained as children transition into adulthood (Kelder, Perry, Klep, & Lytle, 1994), and that behaviors are more malleable among children (Singer, Moore, Garah, & Ellison, 1995), programs for children that promote PA and FV consumption are needed. Although there are many interventions that focus solely on PA (Butcher et al., 2007; Cheon & Reeves, 2015; Fairclough et al., 2013; Hsu et al., 2011; Strong et al., 2005) or FV consumption (Harrington et al., 2009; Jones et al., 2014; Price & Just, 2015; Wengreen et al., 2013), few studies have examined long-term adherence. This poses a need to study the impact of interventions that combine PA and FV consumption and adherence of these programs. In order to increase adherence, interventions need to create positive experiences for children to increase PA and FV consumption in the long-term. Understanding what the children think of their experience and how they feel about the intervention is a vital part to maintaining the behavior being promoted.

In an effort to improve intervention adherence, it is important to more fully and ideographically understand increasing PA and FV consumption and the experience in the

context of a relevant behavioral theory. Self Determination Theory (SDT) aims to explain the interpersonal and environmental conditions that effect human motivation (Deci & Ryan, 1985). SDT concentrates on the importance of an individual's desire for development and behavioral regulation related to external control (Ryan & Deci, 2000). It gives researchers a general outline to explain the origins of intrinsic motivation and self-determined behavior (Morris & Terry, 2011). SDT holds the assumption that individuals have natural, inherent, and constructive tendencies to develop an identified sense of self (Deci & Ryan, 2002).

According to SDT, human behavior is motivated by three primary psychological needs: autonomy, competence, and relatedness (Murcia, Coll, & Perez, 2009). Autonomy is the amount to which a person identifies themselves as the cause of a behavior. Individuals control their own behavior by leading the initiation and course of their actions. It is a continuous process between extrinsic and intrinsic motivation (Ryan & Deci, 2000). Competence refers to an individual being effective in ongoing tasks that he/she is participating in. The more competent a person sees themselves, the more intrinsically motivated they will be at that task. Finally, relatedness is the degree to which an individual feels the sense of belonging and an association to others (Sun & Chen, 2010). In order for a child to transfer to greater self-determined behaviors, these three psychological needs must be met (Rutten, Boen, & Seghers, 2012).

Conceptually, Fit 'n' Cool Kids was aligned with SDT. Components of SDT were integrated into the intervention. Theoretically, by fostering competence, autonomy, and relatedness, children's motivation to eat FV and be physically active will increase. Increases in motivation should equate to behavioral changes, in this case, more FV

consumption and physical activity. In efforts to maximize autonomy, children were allowed to choose when, where, and how they were physically active throughout the school day. For example, they could do jumping jacks during recess or run faster and harder in PE. They also had the option to eat all of the FV offered or they could choose which ones they wanted to consume. The intervention gave students ideas on how to be physically active and introduced them to different fruits and vegetables, but they ultimately got to choose their avenue for PA and FV consumption. Giving the students a sense of autonomy was important because research has shown that it can lead to greater interest and satisfaction in PA (Murcia, Coll, & Perez, 2009).

The intervention was also intended to increase participants' perceived competence by giving students PA and FV consumption goals to reach throughout the week. Each student was given a separate goal for step counts that was challenging yet attainable and they received a class goal for FV consumption. The aim here was to help students achieve their goals and experience a feeling of success and competence.

Lastly, the Fit 'n' Cool Kid characters posed as peer models and were intended to influence behavior and promote relatedness among the students. Previous studies have indicated that peer modeling can have an influence on children's behavior (Romero, Epstein, & Salvy, 2009).

Focus groups were used to examine attitudes and perspectives toward PA and FV consumption promotion. Overall, there is limited research examining students' perspective on school-based interventions, increasing the need to study the impact of Fit 'n' Cool Kids on student behavior throughout the program. Particularly, if students did not enjoy and buy into the Fit 'n' Cool Kids intervention, they would be less likely to

make any behavior change. It was assumed that students would answer interview questions to the best of their ability during the study.

## Archetype

A person's archetype or their interpretive framework is based on their overall beliefs, which outline how they see the world and live in it (Creswell, 2007; Denzin & Lincoln, 2005). Mutually, these beliefs may be termed the archetype or the interpretive framework that grounds a study. Epistemology questions the relationship between the inquirer and the unknown, ontology considers the nature of reality, methodology examines how a person gains knowledge from the world (Denzin & Lincoln, 2005). Qualitative researchers often maintain an interpretive epistemology where the researcher and the researched interact with one another, believe in a contingent ontology in which multiple realities are created, and work within a naturalistic methodology whereby data are collected in the field or in a natural setting (Creswell, 2007; Denzin & Lincoln, 2005). Axiology questions the role of values that the researcher brings to the study and rhetoric considers the language that is used in the research (Creswell, 2007). Researchers tend to carry a value-laden axiology and use a personal voice rhetoric (Creswell, 2007; Denzin & Lincoln, 2005).

Because the goal of this study was to fully understand students' experiences in the implementation of a school-based PA and FV consumption intervention, I have adopted the interpretive archetype in analyzing the collected data. The interpretive archetype enables researchers to understand the phenomenon where reality is subjectively constructed (Lather, 2006). The goal of the research then was to rely as much as possible

on the participants' views of the situation (Creswell, 2007). Interpretive researchers also make an explanation of the data, which is shaped by their own experiences and background and the researcher's intent is to interpret the meaning others have on the topic (Creswell, 2007).

## Methods

### Participants and Setting

The participants of this study were a broad sample of approximately 20 elementary school students (fourth to fifth grades) in groups of four or five from one elementary school in the Salt Lake City, Utah. Previous research has suggested that four to five participants is ideal for focus groups with adolescents (Morgan, Gibbs, Maxwell, & Britten, 2002). Larger groups at this age can be difficult for facilitators to encourage interactive discussions (Morgan et al., 2002). Participants varied in age, gender, and ethnicity. They all participated in the 16-day intervention period (Fit 'n' Cool Kids) prior to the focus group beginning. The gatekeeper to gaining access to the participants was the classroom teachers of the elementary school. Initial contact was made with each teacher to conduct the research.

### Data Collection and Study Procedures

Informed consent and assent forms from the students were obtained in accordance with the University Institutional Review Board. To examine the students' experiences in the implementation of Fit 'n' Cool Kids, I have carried out (a) participant observations at the school site and (b) semistructured focus groups with students in the intervention. The

purpose of using more than one data source is to ensure the reliability of the study (Marshall & Rossman, 2011). Participant observations took place during week 1 (baseline period) and during weeks 2 to 6 (intervention period). Semistructured focus groups lasting around 20 minutes with the students involved in Fit 'n' Cool Kids were carried out after the intervention phase (Morgan et al., 2002).

*Participant Observation*

Participant observation was a good approach to capture subtle responses of the participants towards the intervention program. As the primary researcher, I concentrated on students' behavior (e.g., willingness to participate in the program and barriers encountered in participating) during the intervention period of the study. In addition, I noted changes in students' behavior during the baseline and intervention period of Fit 'n' Cool Kids. Participant observations are often used in applied research such as evaluation of programs (Jorgensen, 1989). The purpose of these indistinct initial observations is to become familiar with the surroundings so as to refine and focus succeeding observation and data collection (Emerson, Fretz, & Shaw, 2011). Preliminary note taking began with routine specifics of the setting such as the physical surroundings and characteristics of the participants (Emerson et al., 2011; Jorgensen, 1989). Focused observations also lead to greater involvement with the participants in the settings and specifically to informal conversations and questioning (Jorgensen, 1989).

Writing field notes is not merely passively copying "facts"; it involves active processes of interpretation on the part of the researcher (Emerson et al., 2011). Field notes should also be written immediately to avoid generality and detailed descriptions of

the processes of interactions should be documented through writing soon and fully (Emerson et al., 2011). While in the field, I documented what I saw visually and also the verbal interactions between the participants. I recorded my observations and feelings by pen and paper. Noting down feelings, hunches, and impressions during the study was useful in judging the course of inquiry and developing future courses of action in the field (Jorgensen, 1989). After each observation, I typed out my field notes and interpretations of the events so that vivid memories of the day's events could unfold. Typing the field notes was beneficial to copy material, rearrange it, and manipulate it for analysis later (Emerson et al., 2011; Jorgensen, 1989).

*Focus Group Interviews*

To examine the students' perspectives of the intervention, group face-to-face semistructured interviews were conducted at a place and time convenient for the classroom teacher at the end of the intervention program. The focus group took place in an informal setting that was outside of the classroom. All interviews began with a game that allowed the participating students to get to know each other. This was in efforts to have an atmosphere that was fun, comfortable, respectful, and free to give opinions (Morgan et al., 2002). Each student was allowed to be on a first-name basis and was encouraged to speak freely about their experience with the intervention. Particularly, students were interviewed to determine their enjoyment, willingness, and barriers in participating in the Fit 'n' Cool Kids program. A total of four focus group interviews were carried out with five students per group. Each focus group lasted approximately 20 minutes, and was digitally recorded and transcribed verbatim. A semistructured focus

group method using open-ended interview questions allowed for flexibility to follow up on any of the open responses that were relevant to the study (Fontana & Frey, 2005).

Before the initial focus groups, I explained to the students the purpose of the focus group, the use of the voice recorder, and asked if they had any questions (Kvale, 1996). Informed consent from the parents and assent from the participants was also obtained. Questions were structured such that connection building questions were asked first to allow me to know my individual focus group participants at a deeper level and to build trust. Also, placing connection building questions at the start of the interview helped ease the participants into the interview. The next set of questions focused on answering the research questions regarding the students' perspectives of the intervention program. The focus group ended with a probing where I mentioned some of the main points learned from the focus group and asked if the students had anything to bring up or ask about the study (Kvale, 1996).

Notes were taken during each focus group, because it helped me formulate new questions as the focus group moves along, facilitate analysis later such as locating important quotations from the recordings, and served as a backup in case the recorder has malfunctioned or erased mistakably during dictations (Patton, 2001). A postreview of the interview was also carried out immediately after each interview ends. The purpose was to record how the children in each focus group responded to the questions, reflect on how well I asked the questions, examine how my rapport was with each focus group, evaluate what problems occurred during the interview, and what could be done to improve on the process. Research indicates that the time after the interview is critical for quality control, which guarantees that data collected is beneficial and accurate (Patton, 2001).

Data Analysis

Data analysis began when I transcribed the interview data verbatim into a word document. Analysis began during transcription, which was a key phase within qualitative methodology (Bird, 2005). By transcribing the data personally, I was able to immerse myself in the data fully and become more familiar with it. It is important to transcribe the information accurately in order to analyze the data properly. While I transcribed the data, I noted key words and quotes that were useful to answering my research question.

After the interviews had been transcribed verbatim into a word document, I perused the focus group transcripts and field notes. Through careful reading of the data, words and phrases that identified and named specific analytic scopes and categories were written in the margins next to the transcript and field notes, on a separate sheet of paper, or in a "comment" field in a word processing program or a keyword field in a text database (Emerson et al., 2011). This process is known as open coding or line-by-line coding. During the coding process, there was no regard for how or whether ideas and categories were ultimately used, or how they were fit together (Emerson et al., 2011). The next step of analysis was selecting essential themes. Priority was given to topics for which a substantial amount of data had been collected or what seemed significant to the participants (Emerson et al., 2011). Next, selected themes were considered and how they were related to other themes. Themes that were unrelated were reincorporated as "subthemes" under general themes (Emerson et al., 2011). After a set of core themes were identified, the transcript and field notes were sorted on the basis of those themes (Emerson et al., 2011). Sorting required physical movement of data excerpts, by either cutting and rearranging copies of the transcripts and field notes, or by using a word

processing program to sort the data (Emerson et al., 2011). After the core themes were decided, and the transcript and field notes were sorted accordingly, the finishing step was focused coding. Focused coding is a fine-grained, line-by-line coding of selected notes and elaborating interesting themes by connecting data and delineating subthemes within the broader topic (Emerson et al., 2011).

## Goodness of Qualitative Data

Goodness of qualitative data has historically been linked to reliability, validity, objectivity and generalizability in quantitative research (Marshall & Rossman, 2011). Alternative constructs that are currently used to describe goodness of qualitative data are credibility, dependability, confirmability, and transferability (Marshall & Rossman, 2011). To maintain goodness of qualitative data in this study, I engaged in the technique of triangulation. Triangulation is "the use of complementary methods, data or investigators in the research, and it is intended to compensate for any one-sidedness or distortion that may result from an individual method, theory, database or researcher" (Steinke, 2004, p. 185). It was important to look at the data from different theoretical angles, in order to uncover new facts of the theory in the data (Flick, 2004). Once the data were analyzed, I connected the data analysis back to literature.

## Researcher as Instrument

Researchers are the primary instrument in qualitative studies and their presence among the participants is fundamental to the methodology (Lofland & Lofland, 1995; Marshall & Rossman, 2011). Because the researchers' personal experiences and

background could influence the interpretation of the data (Creswell, 2007), the study should include some information of the researcher that may affect data collection, analysis, and interpretation (Patton, 2001). Openly probing the researcher's own attitudes, views and practices is one way to maintain the credibility of the study; this is known as reflexivity (Olesen, 2005). Reflexivity also means that the qualitative researcher is mindful of the biases, values, and experiences that he or she brings to a qualitative research study (Creswell, 2007). The way researchers write is a reflection of their interpretations based on the cultural, social, gender, class, and personal politics that they bring to the research (Creswell, 2007). Being reflexive also enhances ethical concerns of the research.

Therefore, it is necessary to inform readers of my personal background experience with the topic, assumptions, and biases because of the interpretive mixed method model I am implementing for this study. I was born and raised in the western part of the US. Currently, I am a PhD candidate in the Exercise and Sport Science Department, with an emphasis in Sport Pedagogy. I have worked with youth for the past 14 years as a gymnastics coach and teacher. Prior to beginning my PhD, I was a PE teacher in Utah at a charter school for 2 years. I also spent a year teaching PE at a public school in Utah during my PhD program. My personal experience as a PE teacher and a coach led me to studying students' experiences with PA and nutrition interventions. I strongly believe in the importance and benefits of PA and nutrition school-based interventions. I also believe that school-based interventions have the potential to increase students' PA levels and FV consumption. I am confident that I will be able to carry out this mixed methodology study because of the training I received from classes in my graduate curriculum. These classes

have provided the foundation for me to carry out this study grounded in mixed methodology. In addition, I have the support of my committee members who are well-versed in quantitative and qualitative research methodology. My personal bias toward this study was that most students would be receptive towards the Fit 'n' Cool Kids intervention and they would enjoy participating in the intervention.

Reflexivity is an ongoing process where researchers maintain an constant critique of all their research attempts that would continue to challenge and acknowledge the political need to represent and find meaning of the participants (Pillow, 2003). One method to maintain an ongoing critique is through a self-reflective journal. Therefore, I maintained a journal, where every major decision I made towards the study, every contact I had with my participants, and any advice I received from my committee members was recorded. In writing my self-reflective journal, I kept in mind my assumptions and biases as I documented my thought-process in making final decisions about a procedure in the study. Reflective journals can be used to make experiences, opinions, thoughts, and feelings visible, thus creating transparency in the research process (Ortlipp, 2008).

## Results

Four student focus groups ($n$ = 20, male 50%) were conducted and group size included five individuals of multiple races and cultures (Hispanic, Ethiopian, and Caucasian). Results from this study revealed a variety of themes of how students viewed the intervention. The data associated with each theme (enjoyment, motivation to participate, and barriers) are presented separately and represented by excerpt from the data.

Enjoyment of Participating in the Fit 'n' Cool Kids Intervention

Given that enjoyment is a foremost reason for children to participate in PA and adhere to life changes (Jago et al., 2009), it was important for the researcher to examine and identify the avenue(s) in which the Fit 'n' Cool Kids intervention brought enjoyment. When looking at enjoyment and fun, most participants mentioned that the intervention as a whole was fun for them. They really enjoyed the characters and felt like the intervention was "a good way to know how much they were exercising during the week." The students thought that the characters were cool and one girls stated "I like Strong Samantha, she is a beast!" Other students expressed that they liked "Speedy Pete because he was cool and fast and we liked his skateboard." One student said "It was fun to see Flexible Fiona because she does gymnastics just like me." Another student believed "the characters were adorable" and others "liked the look of the characters." In general, the students thought that the characters were cool and helped them be more active at school and eat more fruits and vegetables. One student said "The characters helped us eat more fruits and vegetables and be more healthy."

Students also enjoyed being able to see how many steps they took each day using the activity monitors. They like that the monitors were able to "tell you about your exercise."

Motivation to Participate

The majority of the students were motivated to participate in the intervention because they found it to be fun. The goal setting kept them interested in the intervention and increased their motivation to participate each week. Students suggested that the goal

setting motivated them to “move more.” Other students mentioned that the intervention was a good way to keep track of their goals.

In reference to the Fit ‘n’ Cool Kids letters, one student “liked seeing how many times I reached my goal and seeing my new goal each week.” Another student appreciated the letters because “the characters told you that if you didn’t reach your goal, they were right there to tell you that you could do this or that to get better.” One student said “I liked that there were different activities to do each day and different fruits and vegetables to eat so I didn’t get bored.” The letters from the Fit ‘n’ Cool Kids helped the children remember “to be healthier and eat vegetables and fruit.” They also found that wearing the pedometers helped them reach their step count goals. One student used a technique that facilitated more PA; “I put the paper (goal sheet from the Fit ‘n’ Cool Kids) in my binder to remind me to be active during the day.” Other students expressed how the intervention encouraged them to try new fruits and vegetables such as strawberries, purple grapes, pineapple, melons, broccoli, celery, squash, and apricots. One student made a mirthful comment stating “I tried carrots for the first time; they are really good with ranch.”

When students were asked about transferring what they are learning from the Fit ‘n’ Cool Kids intervention to their home life, they had intriguing things to say. Many students said they were more active at home and ate more fruits and vegetables at home after being introduced to the Fit ‘n’ Cool Kids intervention, but others did not transfer their behavior to their home life. Eating more fruits and vegetables at home was difficult for some of the children because “they weren’t in charge of what food was given at home.” The majority of the students did not share with their family about their progress

in the intervention or the premise of the Fit 'n' Cool Kids. There were, however, a few girls in the focus groups who told their parents and siblings about the intervention and explained that it was "helping me be active and more healthy." Overall, the students agreed that the Fit 'n' Cool Kids intervention will help them continue to be more active and eat more fruits and vegetables.

### Perceived Barriers

Although the students enjoyed participating in the intervention, there were a few barriers that challenged them. They identified wearing the pedometers as being a barrier at times. While they liked being able to see their step count progress, "It was kind of a pain to wear pedometers. They were falling off a lot and it was hard not to lose them during the day." Another barrier they talked about was the fruits and vegetables being offered at lunch. Students had stated "they didn't like the variety of fruits and vegetables offered at lunch some days of the week."

## Discussion

In order to determine how effective children believe the Fit 'n' Cool Kids intervention is, it is necessary to consider the factors that influence children's PA and FV consumption. Key individual and environmental factors of participating in a school-based intervention emerged from mixed gender focus group discussions with fourth- and fifth-grade students. The findings reported here would suggest that children are more likely to adhere to an intervention program that is fun, motivating, and gives them a sense of autonomy and relatedness. Some students commented on how the intervention increased

their PA and FV consumption at home although previous research has shown that families with low SES have a hard time affording healthy food. Parents have suggested that fast food is an inexpensive and time saving alternative to cooking healthy food at home (Patino-Fernandez, Hernandez, Villa, & Delamater, 2013).

It is meaningful to consider the perceptions of students participating in the Fit 'n' Cool Kids intervention and examine a school-based intervention from their perspective. It appears that students were attracted to the relatability to the characters and the immediate feedback from the activity monitors. Students also felt a sense of accomplishment when they reached their step count and FV consumption goals. Previous research suggests that intrinsic motivation increases when there is a sense of competence (Deci & Ryan, 2002). Due to time and academic accountability, school administrators may be drawn to an intervention that does not intervene with regularly scheduled core classroom time. It is imperative to note that children enjoyed the Fit 'n' Cool Kids intervention and it was designed to be easy for classroom teachers to implement and cost effective for schools.

A unique and important finding to this study is relative to the opinions of the actual participants in the study. Previous studies have examined the teacher's or school administrator's perception of a school-based intervention (Goh, Hannon, Webster, Podlog, & Pillow, 2014); however, there are very few studies who have examined the perspectives of students. A study by Cox et al. (2010) found that when children were asked about personal responsibility, they generally had more to say about it than parents and teachers did. Children gave a variety of in-depth behaviors and traits associated with being responsible for their own PA. This was more beneficial to adherence to the intervention than parents or teachers perceptions.

## Future Directions

Students had some worthy ideas about how to improve the Fit 'n' Cool Kids intervention. One student recommended "having drills (sports stations) outside to do to be more active." Another student suggested having the whole class go out (aside from recess) and do exercise together (kick ball, tag, etc.). One student requested to have more posters hung around the school and to have the characters represent more than one sport or activity such as swimming. One student also suggested "They should have a huge lunch room with different choices so we can choose what we want rather than only having one or two choices."

# CHAPTER 6

# CONCLUSION

The purpose of this dissertation was to examine the effectiveness of a school-based intervention on elementary students and their experiences with the intervention. The Fit 'n' Cool Kids Intervention that integrates goal setting and character peer modeling was used as the intervention in this dissertation. A three-study approach was used to examine (a) the impact of a school-based intervention on PA intensity and enjoyment in third- to fifth-grade elementary-aged children, (b) the impact of a school-based intervention on PA intensity and FV consumption in fourth- to fifth-grade elementary-aged children, and (c) elementary school students' experiences participating in Fit 'n' Cool Kids. A quantitative methodology was used in the first two studies and a qualitative methodology was used in the third study. The following section presents a summary of each study and implications of the three studies.

## Summary

### Study 1

Study 1 was designed to examine the effects of the Fit 'n' Cool Kids intervention on students' PA and PA enjoyment. Elementary students in grades 3-5 from two schools participated in the first study. One hundred-twelve students wore activity monitors

whose ethnicity consisted of 76% White, 15% Hispanic, 4% Black, and 5% other. Results from the activity monitor data indicated that The Fit 'n' Cool Kids intervention produced significant difference in step counts between schools during the intervention phase $F_{(1,50)} = 5.475$, ($p = .023$) and the follow-up phase $F_{(1,50)} = 9.98$, ($p = .003$). Results also showed a significant difference in MVPA between schools during the intervention phase $F_{(1,50)} = 5.00$, ($p = .030$) and follow-up phase $F_{(1,50)} = 8.726$, ($p = .005$). This suggests that peer modeling and goal setting may promote motivation needed to increase PA among adolescents. There was no significant increase in enjoyment between the baseline, intervention, and follow-up phase of the study. This may be due to student's PA enjoyment already being high during baseline of the study creating a ceiling effect. Further studies with elongated follow-up phases may help to determine the extent to which this behavior change is maintained in the absence of an intervention.

Study 2

Study 2 was designed to examine the effects Fit 'n' Cool Kids intervention on students' PA and FV consumption. The study participants were 187 students in grades 4-5 from two Title 1 elementary schools. Two schools were randomly assigned to one of the following conditions: (1) intervention or (2) control. The students' PA was measured using activity monitors and FV consumption was measured using a FV consumption questionnaire. Results from this study indicated that steps taken were statistically significantly greater in the intervention ($M = 5631.471$, $SE = 249.443$, $p < .05$) compared to the control group over time ($M = 3151.027$, $SE = 182.432$, $p < .05$). There was a statistically significant effect of time on step counts for the intervention group, $F$ (5, 110)

= 4.082, $p$ = .002, partial $\eta^2$ = .157. Results also indicated that MVPA was statistically significantly greater in the intervention ($M$ = 20.43, $SE$ = 0.990, $p$ < .05) compared to the control group over time ($M$ = 11.16, $SE$ = 0.724, $p$ < .05). FV consumption was not significantly greater in the intervention ($M$ = 51.25, $SE$ = 12.311, $p$ > .05) compared to the control group over time ($M$ = 53.63, $SE$ = 12.024, $p$ > .05). One explanation could be that student's lunch periods varied where some students had lunch before recess and others had lunch after recess. Researchers also noticed that when students were served whole apples and whole bananas, they were less likely to consume those foods.

Study 3

Study 3 was designed to qualitatively examine students' experiences in participating in the Fit 'n' Cool Kids intervention. Specifically, students' attitude toward the effectiveness of the Fit 'n' Cool Kids intervention, enjoyment of participating in the Fit 'n' Cool Kids Intervention, motivation to participate, and perceived barriers. Twenty students participated in the study. Focus groups were conducted and group size included five individuals of multiple races and cultures (Hispanic, Ethiopian, and Caucasian). Data were collected through semistructured focus groups and field observations. Results from this study revealed a variety of themes of how students viewed the intervention such as enjoyment, motivation to participate, and barriers. In summary, students indicated that they enjoyed participating in the intervention and it encouraged them to be more physically active and eat more fruits and vegetables. The students also gave suggestions of having physical activity stations outside during recess for more opportunities to be physically active. They also suggested having the whole class go out and do exercise

together. One more suggestion was to have more variety in fruits and vegetables to choose from at lunch time.

# APPENDIX A

## EXAMPLE OF INTERVENTION INTRODUCTION LETTER

Hi Kids,

**My name is Endurance Eddie**

**I'm Flexible Fiona**

**My name is Strong Samantha**

**and I'm Speedy Pete**

# Together we are the Fit 'n' Cool Kids!

We are here to teach you about the importance of physical fitness and nutrition and how to have fun and be healthy all at the same time. Did you know that through physical activities and proper nutrition you can learn about setting goals, meeting challenges, sportsmanship, teamwork, and the value of living a healthy lifestyle? Being physically active and eating healthy can also help you do better in school and improve your self-esteem. Great news isn't it? Kids who value and enjoy physical fitness and health tend to stay active throughout their lives. And staying fit can help you maintain a healthy weight and decrease the risk of serious illnesses and diseases.

Does anyone know how many minutes a day you are supposed to be physically active? (*Allow children to answer*) Kids are supposed to get 60 minutes or one hour of physical activity per day? That's right; you should play for 60 minutes a day. And if you can't be physically active for 60 minutes all at once, don't worry, it's ok to be active in short spurts throughout the day.

Now, does anyone know how many servings of fruit and vegetables you are supposed to eat per day? (*Allow children to answer*) Kids are supposed to eat at least 4 servings of fruits and vegetables per day. A serving of fruit is equivalent to 1 cup (e.g. 1 small apple, 1 banana, 32 seedless grapes, 8 large strawberries) and a serving of vegetables is equivalent to 1 cup as well (e.g. 12 baby carrots, 1 large ear of corn, 1 medium potato, 3 long spears of broccoli).

As Fit 'n' Cool Kids we love being physically active and eating fruits and vegetables in different ways. Endurance Eddie loves to run and play soccer. Having endurance (the ability to be active for a long time) makes Eddie a great soccer player and allows his heart and lungs to deliver blood to working muscles during physical activity. Endurance Eddie also loves to eat fruits that help him keep his energy level up like bananas, oranges, and kiwis. Flexible Fiona likes to do gymnastics and dance. Flexibility makes Fiona a fabulous gymnast and dancer because parts of her body are able to move through their full range of motion. Fiona likes to eat leafy green vegetables like kale, spinach, and broccoli to keep her body feeling great. Strong Samantha loves to bike ride and play sports. Strong muscles allow Samantha to bike in the mountains, play softball, and ski in her free time. Samantha feels energized when she eats berries like strawberries, raspberries, and blueberries. Speedy Pete loves to be active and he has the need for speed. Pete has great muscular endurance which allows his muscles to repeat a movement many times. This makes it easy for Speedy Pete to skateboard after school with his friends without his muscles getting too tired. In order for Speedy Pete to keep his muscles energized he eats sweet potatoes, carrots, asparagus.

Each day, the Fit 'n' Cool Kids are going to give you ideas on how to be physically active and eat more fruits and vegetables at school. This will be called the "Activity of the day" and the "Fruit and Vegetable of the Day". You will also be given a target step goal, which is an individual step goal for you to reach each day. You will wear an activity monitor while you are at school and you will try to do enough physical activity throughout the day so that you reach your step goal. Your class will also be give a fruit and vegetable goal to reach each week. We will observe you in the lunch room and monitor how many fruits and vegetables you eat while you are at school. At the end of each week, the Fit 'n' Cool Kids will let you know how many days you reached your step goal and fruit and vegetable goal. If your goals needs to be changed to challenge you, the Fit 'n' Cool Kids will let you know. You can also keep track yourself by looking at your activity monitor at the end of every day and by keeping track of your fruit and vegetable consumption. Reaching your goals each day will help you keep healthy habits!

Don’t forget to put your activity monitor on at the beginning of the school day, wear it on your right hip, and take it off at the end of each school day. We can’t wait to get moving with you. Good luck with reaching your goals and most importantly, HAVE FUN!

The Fit ‘n’ Cool Kids

# APPENDIX B

## EXAMPLE OF ACTIVITY OF THE DAY LETTER

Hi Students,

Did you reach your pedometer step goal yesterday? If so, great job! Way to be a mover during the school day. We are so proud of you and we hope you are having fun being physically active. Keep up the hard work. If you weren't able to reach your step goal yesterday that's okay. Focus on reaching your step goal by adding a few extra activities into your school day.

## The Activity of the Day is:

(JUMP ROPING AT RECESS)

Good luck and have fun!
The Fit 'n' Cool Kids

# APPENDIX C

## EXAMPLE OF INTERVENTION POSTERS

Don’t forget to

# play for 60 minutes a day!

## How many Fruits and Vegetables have you eaten today?

# APPENDIX D

## EXAMPLE OF WEEKLY STEP GOAL LETTER

Hi _____

Your step goal for this week is _____. Work towards completing this goal every day while you are at school.

The Fit 'n' Cool Kids

Flexible Fiona

Endurance Eddie

Speedy Pete

Strong Samantha

# APPENDIX E

## EXAMPLE OF INDIVIDUAL GOAL LETTERS

Hi _____

Congratulations! You were able to reach your step goal _____ days this week. You are awesome! The Fit ‘n’ Cool Kids love to see you reaching your goals and being active during school. Keep up the hard work and we hope you are having fun. Continue to be active all next week and work towards your step goal every day! Your step goal for next week is _____

The Fit ‘n’ Cool Kids

Endurance Eddie

Flexible Fiona

Strong Samantha

Speedy Pete

Hi _____

It looks like you weren't able to reach your step goal this week. We know you are trying very hard to reach your step goal. The Fit 'n' Cool Kids love to see you being active during school. Try adding more steps into your school day by

- Doing 10 Jumping Jacks before lunch
- Skipping out to recess
- Playing extra hard during P.E.

Continue to be active all next week and work towards your step goal every day! Your step goal for next week is _____

The Fit 'n' Cool Kids

Flexible Fiona

Endurance Eddie

Speedy Pete

Strong Samantha

# APPENDIX F

## EXAMPLE OF PREVIOUS DAY ACTIVITY QUESTIONNAIRE

Name:_____

ID Number:_____

Date: _____

***Previous Day's Activity***

1. Did you wear the pedometer the entire day while at school? Yes No

2. Was there any time you took the pedometer off yesterday? Yes No

   If yes, how long did you have it off? _____

3. Did you go to Physical Education (PE) yesterday? Yes No
4. Did your class have recess yesterday? Yes No

   If yes, how many times? _____

   If yes, what did you do? _____

# APPENDIX G

## EXAMPLE OF NUTRITION QUESTIONNAIRE

# What did you eat and drink yesterday?
# ID#_____

| | Yes | No |
|---|---|---|
| Q1. Did you eat SCHOOL breakfast yesterday? | O | O |
| Q2. Did you eat SCHOOL lunch yesterday? | O | O |
| Q3. Did you fill out your Food Record yesterday? | O | O |

| | None | A few bites | 1 Handful | 2 Handfuls | 3 Handfuls | 4 or more Handfuls |
|---|---|---|---|---|---|---|
| Q4. How much fruit did you eat for **lunch** yesterday**?** | O | O | O | O | O | O |
| Q5. How much vegetable did you eat for **lunch** yesterday**?** | O | O | O | O | O | O |

Fill in the circle of things you drank **yesterday.** This should include breakfast, lunch, dinner and snacks. Mark none if you did not drink the item. Please do not leave any question blank.

| | None | A few sips | 1/2 cup | 1 cup | 2 cups | 3+ cups |
|---|---|---|---|---|---|---|
| Q6. 100% orange juice, apple juice or other 100% juice | O | O | O | O | O | O |
| Q7. Vegetable juice like V8, carrot, or tomato | O | O | O | O | O | O |

Please fill in the circle of the fruits and vegetables that you ate ***yesterday***. Count one handful as a medium sized piece of fruit or vegetable, or about the amount of canned or cooked vegetable that could fit in the cup of your hand. If you did not eat the item mark none.

| Location | None | A few bites | 1 Handful | 2 Handfuls | 3 Handfuls | 4 or more Handfuls |
|---|---|---|---|---|---|---|
| Q8. Fresh or frozen fruit | O | O | O | O | O | O |
| Q9. Canned fruit like peaches, pears, applesauce, or pineapple | O | O | O | O | O | O |

# APPENDIX H

## EXAMPLE OF FRUIT AND VEGETABLE OF THE DAY LETTER

Hi Class,

Did you reach your fruit and vegetable consumption goal yesterday? If so, great job! Way to be healthy eaters during the school day. We are so proud of you and we hope you are having fun trying new fruits and vegetables. Keep up the good work. If you weren't able to reach your goal yesterday that's okay. Focus on reaching your fruit and vegetable goal by adding a few extra bites of fruits and vegetables into your school day.

## The Fruit and Vegetable of the Day are:

(Pineapple and Beets)

Good luck and have fun!
The Fit 'n' Cool Kids

# APPENDIX I

## EXAMPLE OF CLASS FRUIT AND VEGETABLE CONSUMPTION

Hi _____

Your grade fruit and vegetable goal for this week is _____. Work towards completing this goal every day while you are at school.

The Fit 'n' Cool Kids

Flexible
Fiona

Endurance
Eddie

Speedy
Pete

Strong
Samantha

# APPENDIX J

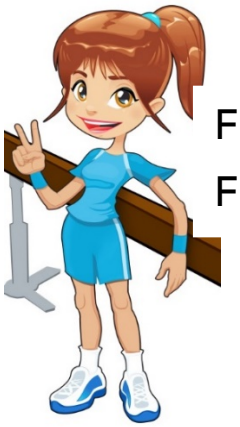
## EXAMPLE OF FRUIT AND VEGETABLE GOAL LETTERS

Hi _____

Congratulations! Your grade was able to reach their fruit and vegetable consumption goal _____ days this week. You are awesome! The Fit ‘n’ Cool Kids love to see you reaching your goals and eating fruits and vegetables during school. Keep up the hard work and we hope you are having fun. Continue to eat fruits and vegetables all next week and work towards your class goal every day! Your grade goal for next week is _____

The Fit ‘n’ Cool Kids

Endurance
Eddie



Flexible
Fiona

Strong
Samantha

Speedy
Pete

Hi _____

It looks like you weren't able to reach your fruit and vegetable consumption goal this week. We know you are trying very hard to reach your goal. The Fit 'n' Cool Kids love to see you eating healthy during school. Try adding more fruits and vegetables into your school day by

- Eating one fruit or vegetable at the beginning of lunch
- Make your last bite of lunch a fruit or vegetable

Continue to eat fruit and vegetables all week and work towards your goal every day! The class fruit and vegetable goal for next week is _____

The Fit 'n' Cool Kids

Flexible
Fiona

Endurance
Eddie

Speedy
Pete

Strong
Samantha

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