EVALUATING ADULT INTERACTION DURING THE STEP IT
UP! GAME TO INCREASE PHYSICAL ACTIVITY IN CHILDREN

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By
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CERTIFICATION OF APPROVAL

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ABSTRACT

Insufficient amounts of physical activity and excessive consumption of high-calorie and low-nutrient foods has led to an alarming rate of young children being overweight with the possibility of early-onset obesity; therefore, methods to increase physical activity in children are warranted. The Step it UP! game is an intervention consisting of an interdependent group contingency that has increased student engagement in physical activity when compared to no game during recess periods. Previous research has also demonstrated that adult interaction may encourage physical activity. The current study compared the effects of no game, Step it UP! game, and Step it UP! game plus adult interaction on the number of steps taken by participants during recess periods using a multielement design. One, third-grade general education classroom consisting of 25 students was divided into two teams and each participant was given a pedometer to wear during recess. The participants in the team with the highest, average step count at the end of recess received prizes (i.e., mini-trophies, smelly stickers, and emoji stamps). Overall, 19 of the 25 participants had higher step counts during the Step it UP! game plus adult interaction when compared to the Step it UP! game and no game during recess periods. In addition, 20 participants preferred the Step it UP! Game plus adult interaction. These results suggest that adult interaction can enhance the effects of the Step it UP! Game to increase physical activity.

INTRODUCTION

The World Health Organization (WHO, 2018) estimated that in 2016, more than 340 million children and adolescents between the ages of 5 and 19 years old were overweight or obese. Children who are obese are also more likely to be obese as adults and have a greater chance at being at risk for cardiovascular diseases, diabetes, some cancers, and musculoskeletal disorders (WHO, 2018). Children's diets may consist of fast food or foods with no nutritional value, which can increase their chances of being overweight or obese. Increasing the total number of calories consumed daily along with a decrease in the total number of calories expended can lead to individuals being overweight or obese.

In addition to diet, physical inactivity contributes to the possibility of early-onset obesity. Being physically inactive can have negative effects on the body such as accelerated weight gain, loss of bone density with age, muscle loss, and the possibility for arthritis (CDC, 2018). In contrast, engaging in physical activity can provide both physical and mental benefits. For example, engaging in physical activity can decrease the risk of cardiovascular disease, Type 2 diabetes, and some cancers (WHO, 2018; CDC, 2018). Besides decreasing these health risks, exercise improves overall health by strengthening muscles and bones and preventing future arthritis and joint pains. Furthermore, exercise contributes to mental health by sharpening thinking, learning, and decision-making skills (CDC, 2018).

The ultimate benefit of eating healthy food and engaging in regular physical activity is a long life and the ability to complete daily activities with ease. While

promoting a healthy lifestyle includes making healthy food choices and engaging in physical activity, it may be difficult to consistently monitor the food that individuals consume throughout the day. Therefore, identifying methods to increase physical activity might be a more practical approach by which therapists can encourage a healthier lifestyle.

WHO (2018) recommends that children amass 60 min of moderate-to-vigorous physical activity (MVPA) a day. In order for children to meet their daily goal of 60 min of MVPA children can engage in small amounts of physical activity that add up to 60 min by the end of the day. A few physical activities considered moderate-to-vigorous are walking quickly, skating, dancing, jumping rope, jogging, running, and playing a team sport (CDC, 2018). As the number of children who are overweight or obese continues to rise, providing daily opportunities for children to make healthy food choices and engage in physical activity might be particularly important.

Increasing Physical Activity in Adults

Behavioral interventions have proven to be useful in increasing physical activity in adults (Efrat, 2013; Foote et al., 2017; Hayes & Camp, 2015; Hirsch, Healy, Judge, & Lloyd, 2016; Hustyi, Normand, Larson, & Morley, 2012; Krentz, Miltenberger, & Valbuena, 2016; Kuhl, Rudrud, Witts, & Schulze, 2015; LaLonde, Macneill, Eversole, Ragotzy, & Poling, 2014; Zerger, Miller, Valbuena, & Miltenberger, 2017). For example, Krentz et al. (2016) used token reinforcement to increase the walking distance of five adult men with intellectual disabilities.

Researchers provided a token to each participant upon completing a 50-m lap, along with praise from the researcher at the end of each lap. Each participant was required to walk for 1 hr and then exchanged in the tokens they had earned for pre-determined reinforcing items such as Gatorade, books, Uno card games, and CDs. The results of the study demonstrated that the token system was effective at increasing the walking distance of four out of the five participants.

In another study, LaLonde et al. (2014) used a treatment package consisting of goal-setting and positive reinforcement to increase the number of daily steps. The participants in the study consisted of three men and one woman who were between the ages of 21 and 26 years old and all diagnosed with Autism Spectrum Disorder. Step goals for each participant were predetermined by the researcher and calculated by taking the average number of steps during baseline and increasing the number by 10% each time the previous goal was met for two consecutive days. If participants met their goal, they were able to choose an item from the prize bin (e.g., gum, pencils, pens, stickers, and removable tattoos). Each participant wore a Fitbit activity tracker to track their daily steps. At the end of the study the authors found that each participant increased their daily step count by reaching the recommended goal of 10,000 steps or more per day. In sum, both studies by Krentz et al. (2016) and LaLonde et al. (2014) provide examples of the success of behavioral interventions to increase physical activity in adults.

Interventions to Increase Physical Activity in Children

Achieving increases in physical activity in adults is important but targeting physical activity at a young age could have a greater impact. It may prevent the early-onset of health consequences in children and adolescents. While there are many areas in the community where efforts to support healthier eating and active lifestyles can be provided by adults or caregivers, children spend a great amount of their day at school, typically five days per week. Therefore, school settings are an ideal place to target physical activity in children. Throughout the school day children have opportunities to engage in physical activity during physical education class and recess periods. Several studies over the past decade have evaluated various antecedent and consequence-based interventions for increasing physical activity in children.

Manipulating the environment to assist in evoking a desired response or to assist in the reduction of an undesired response is known as an antecedent manipulation. Antecedent-based approaches to increase physical activity might be as simple as providing different types of equipment. For example, Hustyi et al. (2012) evaluated context effects during outdoor activities on four typically developing preschool children's physical activity. The researchers implemented antecedent manipulations by arranging certain aspects of the participant's play environment before exposing them to the actual environment. The researchers arranged for a total of three experimental conditions (outdoor toys, fixed equipment, open space) and one control condition (access to activities not expected to evoke high levels of physical activity). The researchers used the Observational System for Recording Physical

Activity codes (OSRAC) to evaluate the levels of physical activity (Hustyi et al., 2012). The levels in the OSRAC consisted of: (a) stationary movements or motionless, (b) stationary with limb or trunk movements, (c) easy, slow movements, (d) moderate movements, and (e) fast movements. The results of the study showed that the fixed equipment condition (e.g., slides, monkey bars, stairs, and climbing areas) generated the most MVPA for all participants.

In another study, Shayne, Fogel, Miltenberger, and Koehler (2012) evaluated the effect of exergaming on participant engagement in physical activity as well as the opportunity to engage in physical activity. Exergaming consisted of using interactive video games as a form of exercise in a physical education class. Exergaming provided the students with more opportunities to engage in physical activity, and students remained engaged in physical activity for a longer period relative to the regular PE lesson plan. The results of these studies can assist in identification of environments that encourage children to participate in physical activity, as well as assist in the creation of interventions for children. However, in some cases, it might not always be possible to provide access to these environments due to school budgets.

Researchers have combined antecedent manipulations with consequence-based interventions, such as contingent reinforcement, to increase physical activity during recess in elementary schools (e.g., Efrat, 2013; Foot et al., 2017; Hayes & Camp, 2015; Zerger et al., 2017). Studies have used different interventions including group contingencies (Foote, 2017), modeling (Efrat, 2013), prompting (Efrat, 2013), feedback (Hayes, 2015; Zerger, 2017), goal setting (Hayes, 2015; Foote, 2017), self-

monitoring (Hayes, 2015; Zerger, 2017), student pairing (Zerger, 2017), and reinforcement (Hayes, 2015; Zerger, 2017; Foote, 2017). The results of each study showed an increase in student physical activity during intervention phases when compared to baseline phases.

Group Contingencies

Group contingencies involve providing a reward to several or all members of a group contingent on performance of all, several, or one member (Mayer, Sulzer-Azaroff, & Wallace, 2014). Several studies that have measured physical activity in adults and in children have used group contingencies as part of their intervention (e.g., Foote et al., 2017; Galbraith & Normand, 2017; Hirsch et al., 2016; Jung, Suroto, Fukugasako, & Takahashi, 2005; Kuhl et al., 2015), likely because they are easy to implement with multiple individuals simultaneously and may foster positive interactions among group members. There are three ways in which an experimenter can organize a group contingency: independent, dependent, and interdependent. In an independent group contingency, delivery of the reward is contingent on each individual and their own performance regardless of whether other members do or do not earn their reward. In a dependent group contingency, delivery of the reward to all group members is contingent on the performance of one or a few group members. In an interdependent group contingency, delivery of the reward is contingent on the performance of all group members.

Kuhl et al. (2015) compared two interdependent group contingencies, (a) cumulative classroom goal and (b) an 80% criterion of participants required to meet

their individual goal, on the number of children's daily steps. Two classrooms with a total of 30 children participated. Prior to intervention sessions the teacher had students vote between five activities that would be used as potential reinforcers. Both classrooms voted for extra recess time as the most preferred. Thus, an extra 15 min of recess was used as the reward during the study. The researchers calculated cumulative goals by averaging the number of steps each participant took during baseline and adding an additional 1,500 steps to the average. The researcher then set a criterion for reinforcement by taking the cumulative steps taken by all children in the classroom over the span of 4 days. Individual goals were determined by averaging the daily step counts recorded across 4 days of the previous baseline and adding an additional 1,500 steps to the calculated average. Individual goal setting worked best at increasing physical activity when compared to cumulative classroom goal setting. The researchers noted that receiving individual feedback, in the form of praise for meeting their goal or in the form of a neutral statement of encouragement for not meeting the goal, may have been an important aspect of the study that influenced physical activity.

In another study, Hirsch et al. (2016) showed the levels of engagement in physical activity were greater when a PE teacher implemented an interdependent group contingency during physical education classes when compared to the standard implementation of the teacher's lesson plan.

Overall, the use of a group contingency to increase physical activity shows promise and may be preferred by teachers. Furthermore, an interdependent group

contingency may be ideal because it involves all individuals working together as a team to meet a goal and earn reinforcement. A specific intervention that often utilizes an interdependent group contingency is the Good Behavior Game (GBG; Barrish, Saunders, & Wolf, 1969).

The Good Behavior Game (GBG)

The GBG has been implemented by teachers and researchers in classroom settings to reduce disruptive behavior. Components of the GBG include rules, teams, feedback following disruptive behavior, and reinforcers available to the team(s) that stay below a set criterion of points. The GBG has repeatedly shown to be an effective procedure in decreasing disruptive behaviors across a range of student populations and contexts (Bowman-Perrott, Burke, Zaini, Zhang, & Vannest, 2015; Flower et al., 2014). Of the many adaptations of the GBG, researchers have recently implemented the game to increase physical activity.

The Good Behavior Game and Physical Activity

The GBG has proven to be an effective behavior management procedure that is low cost and easy to implement. Using the GBG to encourage increases in physical activity might be an ideal way to arrange an interdependent group contingency. Specifically, student participation is required for all members in a group, or all groups, to receive a specific consequence (i.e., reinforcer). There is a potential for students to encourage one another to continue to engage in physical activity in order to be the winning team and receive the pre-determined reward. Rewards used during

the GBG can include things like more time in recess, stickers, stamps, or trophies depending on the classroom grade level.

Jung et al. (2005) used the GBG with children during PE class. During the GBG, researchers delivered points on a momentary time schedule to a group contingent on the participants following the rules (e.g., engaging in skill practice, drills, scrimmages, games, fitness activities, warm-up, and cool-down). Team points were exchangeable for photos posted on a bulletin board in the hall, free access to playing badminton, free entry into a dodgeball game, free entry into a baseball game, and access to a computer during lunch. Although the GBG produced an increase in the target behaviors, physical activity was not specifically measured. In addition, the researchers did not define the momentary time schedule. Recently, Galbraith and Normand (2017) extended the work by Jung et al. (2005) by assessing the effect of a variation of the GBG on the step counts of participants rather than rewarding points on a momentary-time schedule of student engagement in motor activity.

The variation of the GBG by Galbraith and Normand (2017) to increase step counts was referred to as the “Step it UP!” game. The researchers divided the third-grade class into two teams that remained the same throughout the entire study. Each student wore a pedometer to keep track of their step counts. During recess, the researchers delivered verbal prompts on a variable-time 3 min schedule (on average every 3 min) to remind students to engage in physical activity (e.g., “Don’t forget the team who moves the most will be the winner” p. 858). Immediately after recess, the researcher calculated the average step counts for both teams, announced the team that

won (took the most steps), and delivered “Step it UP! Champ” badges to all members of the winning team. At the end of the day, the students traded their badge for a ticket that entered them into the weekly school lottery. The prizes in the weekly lottery consisted of stickers, snap bracelets, crayons, and coloring pages. The students in both teams took more steps during recess when the researchers implemented the Step it UP! game compared to recess periods without the game.

Factors Influencing Physical Activity

Peer interactions during the Step it UP! Game may be one component of the game that influences its effectiveness. According to the CDC (2018), providing support and supervision of child directed play, supporting extended play, prompting and encouraging physical activity are all ways in which peers and adults can help children meet the daily recommendations for physical activity. Therefore, adult interactions may also influence levels of physical activity.

Larson, Normand, Morley, and Miller (2014) conducted a functional analysis of MVPA to examine the effect of several consequent variables on the MVPA of four children attending a local day care center. The researchers used the OSRAC codes, similar to Hustyi et al. (2012), to score the levels of physical activity for all phases of the study. The researchers included alone, escape, attention, interactive play, and control conditions. The interactive play condition consisted of the experimenter providing verbal attention along with engaging in interactive play with the children contingent on MVPA. The attention condition consisted of the experimenter providing specific verbal attention in the form of descriptive praise contingent on

MVPA (“I love how you’re running!” p. 202). The escape condition consisted of the experimenter removing all demands contingent on the participants engaging in MVPA. The alone condition consisted of the participants alone in the play area with no programmed consequences contingent on MVPA. The control condition consisted of the experimenter providing the participant with their presence, attention, and interaction every 30 s along with no delivered consequences for engaging in MVPA. The results demonstrated that children engaged in higher levels of MVPA when the adult provided interaction contingent on MVPA. They also showed that simply providing verbal attention functioned as a reinforcer and increased the levels of MVPA in the children.

The study of procedures to increase physical activity in children is an emerging area of research in behavior analysis that warrants additional research to determine the relevant variables influencing behavior change. Galbraith and Normand (2017) demonstrated the effectiveness of the Step it UP! Game to increase physical activity. Larson et al. (2013) showed that children engaged in the highest level of MVPA when an adult provided contingent interaction, but it may not always be feasible to assess every child individually. By using a variation of GBG and applying the findings by Larson et al. (2013) researchers can assess MVPA in the form of step counts with larger groups of children. Researchers can also compare whether there are significant differences in the number of step counts when children receive adult and peer interaction when engaging in MVPA versus when children only receive peer interaction. Therefore, the purpose of the present study was to compare the Step it

UP! game (no adult interactions) to the Step it UP! game plus contingent adult interactions to increase physical activity of students in a third-grade general education classroom during recess. By comparing adult interaction with no adult interaction, we determined whether adult interaction produced higher levels of physical activity, thus maximizing the probability of physical activity during recess. We hypothesized that adult interactions would enhance the effectiveness of the Step it UP! game and result in a greater number of steps when compared to no adult interaction.

METHODS

Participants

The researcher contacted teachers from a local public school via email and selected the first teacher who responded and expressed interest in having their class participate in the study. One third-grade general education classroom consisting of 25 students (11 girls and 14 boys) participated. Prior to data collection, the researcher met one-on-one with the teacher to provide her with general details about the study, answer any questions the teacher had, and collected the signed consent form. The researcher sent home opt-out forms with each student for their parents to review; however, no student returned an opt-out form and all 25 students from the teacher's class participated in the study. In addition, the researcher provided students with the opportunity to opt-out from participating in the study prior to beginning a session or at any time during the session. Throughout the study there were no instances of a participant choosing to opt-out from participating in the study.

Settings and Materials

Researchers collected data during the regular morning recess period on the outdoor play area at the school 1 to 3 days a week. During each session, participants had free access to all play structures, playing equipment, pavement areas, and grassy areas. Participants were able to interact and engage with any peers who were also on the playground. Throughout the course of the study the participants wore a Pedusa PE-771 Tri-Axis Multi-Function Pocket pedometer (Pedometersusa, 2018). The pedometers did not contain a hinged cover; thus, the step counts on the digital display

were visible. To prevent feedback on step counts, the researcher sealed all the pedometers with tape during all sessions. Sealing the pedometers prevented the participants from viewing their step count or potentially resetting their pedometer. The researcher adjusted each participant pedometer to reflect the average weight and stride of a 3rd grade student between the ages of 8 and 9 years old. All participants wore the pedometers on their waist. If participants were not wearing a clothing item where the pedometer could be hooked a Velcro strap was provided for them to wear around their waist. The researcher used colored wrist bands to identify the participants in both teams and tape to cover the display on the pedometers during all baseline and Step it UP! sessions.

Response Measurement

The researcher measured the total steps taken by each student and averaged across teams in the classroom after every session. Each participant wore a Pedusa PE-771 pedometer that recorded the total number of steps during all sessions throughout the study. The duration of recess periods varied across sessions. In order to account for the variation in duration of recess periods the researcher divided the average number of steps for each team by the duration of the session in minutes to determine the average number of steps per minute for each group.

The researcher also measured changes in individual step counts across conditions. The researcher analyzed individual data by adding the number of steps taken across sessions in a condition, dividing the total number of steps by the number of sessions, and dividing the average number of steps by the average duration of

recess periods in minutes for the condition. This process was repeated to obtain summary step count measures for each condition (i.e., no game, Step it UP! game, and Step it UP! game plus adult interaction).

Interobserver Agreement and Intervention Integrity

The researcher and a second independent observer collected interobserver agreement (IOA) on the pedometer step count for all participants. Both the researcher and the second independent observer viewed the step count on the pedometers at the end of the sessions and independently recorded the step count for each individual pedometer on the data sheet (Appendix A). Interobserver agreement was collected for 42% of no game sessions, 50% of Step it UP! game sessions, and 33% of Step it UP! game plus adult interaction sessions. To ensure a sufficient number of sessions with IOA data, the researcher occasionally took a picture of each pedometer as they were being collected, and concurrently wrote down the step count. A second observer later looked at the pedometer pictures and IOA data were collected for that session. The researcher calculated IOA by dividing the total number of agreements on pedometer step counts by the total number of participants in the session and multiplying by 100. Mean percentage agreement across no game, Step it UP! game, and Step it UP! game plus adult interaction sessions with IOA was 100%.

To ensure the researcher implemented the intervention as planned, a second independent observer completed a checklist that outlined all the steps required when implementing both of the Step it UP! games (Appendix B). For example, if the researcher explained the rules of the Step it UP! game before allowing the students to

go to recess the independent observer circled “Yes” next to the question labeled “Delivered or Explained Rules?” The independent observer circled the answer corresponding to the appropriate step within the implementation of the Step it UP! games. If the researcher did not complete a step on the checklist, or did so incorrectly, the independent observer circled “No.” If a step was not applicable the independent observer circled “N/A.” In addition, during the Step it UP! game plus adult interaction sessions the second independent observer used the table corresponding with the checklist to track researcher and participant engagement in MVPA. While out on the play area the second independent observer wore a MotivAider set to vibrate on fixed time (FT) 15-s schedule. When the MotivAider vibrated the second independent observer scanned the play area and circled “Yes” or “No” for both participant and researcher engagement in MVPA. The table contained 60, 15-s blocks for a total of 15 min. Due to scheduling conflicts, a second observer completed the checklist once during a no game session and once during a Step it UP! game session. Percentage accuracy was 85% for the no game session and 100% for the Step it UP! game session.

Procedure

We used a multi-element research design to compare no game, the Step it UP! game, and the Step it UP! game plus adult interaction on the number of steps taken during recess. The researcher returned to the classroom 4 ½ weeks after the final session in the multi-element design to conduct a student preference component. The session durations averaged 16.5 min (range, 13.2-21.4 min).

The researcher used a random list generator to determine the condition (no game, Step it UP! game, and Step it UP! game plus interaction) to implement before every session. Each condition was implemented by the researcher no more than two times consecutively. If a condition had been conducted twice in a row, then the other condition was implemented. During the initial baseline session, the researcher assigned each participant a numbered pedometer and participants used the same pedometer throughout the study. Throughout all research sessions the teacher was asked to respond normally during recess (i.e., observed students and interacted only if it was student initiated).

Before the first intervention session the researcher used the data collected for each participant during the initial baseline session to separate participants into two teams with similar mean step counts. The researcher created a list of the student step counts and ranked participants from highest to lowest step count. Then, the researcher assigned each participant, starting from the highest down to the lowest, a number one or a number two in an alternating fashion. Participants whose step counts on the list had been assigned a number one became Team 1 and participants whose step counts had been assigned a number two became Team 2. For consistency, the two teams remained the same throughout the course of the study. Team 1 consisted of 13 participants and Team 2 consisted of 12 participants.

During the first few intervention sessions the researcher stated the pedometer rules, “Remember don’t shake the pedometer or press any buttons while you play.” During subsequent sessions the teacher sometimes told the participants the pedometer

rules. The researcher distributed pedometers to the participants as they exited the classroom to recess and collected all pedometers as participants re-entered the classroom after recess. All sessions began when the first participant had their pedometer and exited the classroom, and all sessions concluded when the last pedometer was collected and the participant had reentered the classroom.

No Game

The purpose of the no game condition was to serve as a control to evaluate the step count of participants during recess periods with no game and recess periods with a game. During all no game sessions the researcher observed participants during their regular recess period on the playground, delivered no programmed consequences, and did not interact with the participants.

Step it UP! Game

Prior to going outside for recess the researcher (or teacher) stated the pedometer rules (i.e., “Remember no shaking and pressing buttons”), the researcher stated the game rules (i.e., “Don’t forget that every member of the team with the most steps will get a prize at the end of recess”), distributed the pedometers, and started the timer when the last participant exited the classroom. Once all participants were outside on the playground the researcher observed the participants engage in MVPA from an appropriate distance (e.g., 100 ft). If any participants attempted to engage with the researcher during recess, while engaged or not engaged in MVPA, the researcher provided minimal interaction and attention by appearing to be “busy” (i.e., pretending to look at checklist or writing a note). This Step it UP! Game condition

consisted of no researcher interaction with the participants when they engaged in MVPA during recess. At the end of recess, the researcher collected the pedometers from all participants as they entered the classroom and stopped the timer when the last participant had entered the classroom. The researcher immediately calculated the average number of steps taken for each team and announced the winning team within 10 min. If the difference in average steps per min between the teams was 50 steps or less, both teams won. In collaboration with the classroom teacher, the researcher selected appropriate prizes to be delivered to the winning team(s) immediately after the average step count for each team was calculated. On one occasion the researcher was unable to immediately deliver prizes after announcing a winning team due to scheduled testing within the school. The prizes that were used throughout the study consisted of mini-trophies, smelly stickers, and emoji stamps. The winning team(s) chose between receiving an emoji stamp or a smelly sticker, along with receiving a mini-trophy that stayed on the desk of each of the team members desk until the next game day.

Step it UP! Game + Interaction

This condition consisted of all components of the Step it UP! Game described above plus the researcher interacting with the participants contingent on MVPA during recess, similar to the interactive play condition in Larson et al. In addition, one occasion the researcher was unable to immediately deliver prizes after announcing a winning team due to scheduled testing within the school. (2014). Moderate-to-vigorous physical activity was defined as moving from one place to another at a

moderate or fast pace (e.g., running during tag, jumping rope, or climbing the play structure). Prior to going outside for recess the researcher stated, “Today I can play with you.” When all participants were out on the play area, the researcher observed for any engagement in MVPA (i.e., jumping, running, climbing). The researcher engaged in MVPA with the participants and provided interactive play by joining in the same activity (i.e., running during tag, jumping rope, or climbing the play structure) and providing verbal statements or praise (i.e., “You all are playing so well,” “This is so fun!” “Let’s climb like spider-man”). During this condition, the researcher wore a MotivAider set to vibrate on fixed time (FT) 30-s schedule. When the MotivAider vibrated, the researcher scanned the playground for participants who were engaged in MVPA and joined them. Thus, the MotivAider prompted the researcher to interact with other participants and distribute their time across all participants who were engaging in MVPA. For example, if the participants were running and playing tag with each other, the researcher began to run and play tag with the participants until the MotivAider vibrated. If participants no longer continued to play tag and engage in MVPA (i.e., jumping, running, climbing), the researcher stopped engaging with the participants, walked a few feet away, and identified other participants who were engaged in MVPA.

Participant Preference.

The researcher conducted a participant preference assessment 4 ½ weeks after the last intervention session. The researcher walked to each participants desk, one at a time, and asked each participant which condition (i.e., no game, Step it UP! game, or

Step it UP! game plus adult interaction) they preferred and why. The researcher implemented the condition with the most participant votes that day.

RESULTS

Figure 1 displays the mean step counts per minute for Team 1 (top panel) and Team 2 (bottom panel) across no game, Step it Up! Game, and Step it Up! Game plus adult interaction. Team 1 (top panel) averaged 81 steps per min (range, 76-96) during no game, 88 steps per min (range, 81-104) during the Step it UP! game, and 91 steps per min (range, 87-95) during the Step it UP! game plus adult interaction. Overall, the average steps per min occurred at lower and differentiated levels during all no game sessions compared to the Step it UP! game and Step it UP! game plus adult interaction sessions. There was also differentiation between the average steps per min during the Step it UP! game and Step it UP! game plus adult interaction sessions; higher levels of steps per min occurred during the Step it UP! game plus adult interaction sessions compared to the Step it UP! game.

Team 2 (bottom panel) averaged 84 steps per min (range, 79-96) during no game, 87 steps per min (range, 80-105) during the Step it UP! game, and 92 steps per min (range, 88-99) during the Step it UP! game plus adult interaction. Overall, the average steps per min occurred at lower and differentiated levels during all no game sessions and Step it UP! game sessions compared to Step it UP! game plus adult interaction sessions. There was also differentiation between the average steps per min during the Step it UP! game and Step it UP! game plus adult interaction sessions;

Figure 1. Average step count per min across Team 1 (top panel) and Team 2 (bottom panel).

higher levels of steps per min occurred during the Step it UP! game plus adult interaction sessions compared to the Step it UP! game. Across both teams, the steps per min were higher during the Step it UP! game plus adult interaction sessions during intervention. During the participant preference and follow-up probe, the

majority of students chose the Step it UP! Game plus adult interaction (Table 1).

During the Step it UP! game plus adult interaction session, the average steps per minute decreased (83 steps per min for Team1 and 84 steps per min for Team 2) to levels similar to those observed in the Step it UP! game intervention sessions.

Table 1.

Participant votes for preferred condition and comments when asked why they preferred a condition. We excluded repeat comments.

Condition	# of votes	Comments
No Game	1	"Because when playing the game, we can forget we are playing, and I don't like that"
Step it UP!	4	"We get points and prizes" "I like to win" "It's fun to be on a team with my friends" "We get to play tag and stuff"
Step it UP! + Interaction	20	"It's more fun because you played" "There are more players" "There's more people to play with and adults don't normally play" "You played with us and it was fun" "It was more competitive" "I liked playing with you because you get to experience how to get more steps"

The researcher calculated the percentage of nonoverlapping data (PND) by counting the number of data points in the intervention condition (Step it UP! game or Step it UP! game plus adult interaction) that remained above, and did not overlap, the highest data point in the comparison condition (no game or Step it UP! game), dividing the sum by the total number of intervention sessions, multiplying by 100. We used this calculation to compare no game to Step it UP! game, no game to Step it

UP! game plus adult interaction, and Step it UP! game to Step it UP! game plus adult interaction, across both teams during the second phase of the multielement (i.e., when we introduced pre-session reminders) . PND was 100% across all comparisons for Team 1. PND was 100% in the no game to Step it UP! game and Step it UP! game to Step it UP! game plus adult interaction comparisons, and 25% in the no game to Step it UP! game comparison, for Team 2.

Figure 2 displays the mean step counts per minute for each participant in Team 1 (top panel) and Team 2 (bottom panel) across no game, Step it UP! game, and Step it UP! game plus adult interaction. For Team 1, 11 of 13 participants had higher step counts during the Step it UP! game or Step it UP! game plus adult interaction sessions compared to no game. Two participants had similar step count levels between no game sessions and one variation of the game (i.e., Step it UP! game or Step it UP! game plus adult interaction). Overall, 9 participants took more steps per min during the Step it UP! game plus adult interaction sessions than other conditions in Team 1. For Team 2, 10 of 12 participants had higher step counts during the Step it UP! game or Step it UP! game plus adult interaction sessions when compared to no game. Two participants had step counts that were similar or greater during no game sessions when compared to both game variations (i.e., Step it UP! game and Step it UP! game plus adult interaction). Overall, 10 participants took more steps per min during the Step it UP! game plus adult interaction sessions than other conditions in Team 2. Across both teams, 19 of 25 students took more steps during the Step it UP! Game plus adult interaction compared to no game and the Step it UP! Game.

Figure 2. Average step count per minute in each condition across participants in Team 1 (top panel) and Team 2 (bottom panel).

DISCUSSION

The purpose of the present study was to compare the Step it UP! game (no adult interactions) to the Step it UP! game plus contingent adult interactions to increase physical activity of students in a third-grade general education classroom during recess. This study is the first to evaluate the effects of adult interaction during implementation of the Step it UP! game. The results of the study determined that the Step it UP! Game plus adult interaction contingent on participant engagement in MVPA produced more steps for 19 of 25 participants during recess compared to the Step it UP! Game with no adult interaction and no game. Similarly, during the participant preference and follow-up probe, 20 of 25 participants chose the Step it UP! game plus adult interaction as the preferred condition. These results support Larson et al. (2013) in that children engaged in the highest level of MVPA when an adult interacted with the participants and provided verbal attention contingent on physical activity. In addition, the results in this study are consistent with those found by Galbraith and Normand (2017). Specifically, students took more steps during recess when the researchers implemented the Step it UP! game compared to recess periods without the game.

There are a few procedural differences between the current study and Galbraith and Normand (2017) that warrant discussion. First, unlike Galbraith and Normand (2017), we did not provide the participants with a scheduled reminder of the game rules (“Don’t forget the team who moves the most will be the winner!”) during recess when implementing both versions of the game, but the Step it UP! Game was

still effective. These effects may have been observed due to students not hearing the researchers reminders or the reminders may have had weak stimulus control over participant engagement in MVPA. There is a potential to strengthen stimulus control of reminders to further increase student engagement by pairing the reminder with adult interaction. Then, the reminder might become a discriminative stimulus for participants to engage in MVPA which would result in contacting social positive reinforcement. As mentioned above, not adding a reminder to the Step it UP! game was still effective at increasing participant step counts. Therefore, the reminder alone may not be a critical component of the Step it UP! game, but future research is needed to directly explore these effects.

Second, in the current study we delivered the prizes immediately following the announcement of the winning team(s) whereas Galbraith and Normand (2017) distributed badges that were exchanged later by the participants for a lottery ticket corresponding to a weekly school-wide lottery. Although we delivered prizes immediately after the games in the current study, it did not appear to have any significant effect on the step counts of both teams compared to the step counts observed by Galbraith and Normand (2017). Due to scheduled testing within the school, the researcher was unable to immediately deliver prizes after announcing a winning team during two separate game sessions in the current study. The researcher left the prizes for the teacher to distribute later in the day. The change in schedule of delivery of prizes for those two sessions had no effects on the step counts of each team on game sessions to follow. Delayed prizes may be effective because winning

the game occurs immediately and winning itself may function as a reinforcer for physical activity. Therefore, the immediate or delayed delivery of prizes may not be a critical factor for the effectiveness of the Step it UP! game. This finding is in contrast with Harris and Sherman (1973) who found that the delivery of reinforcers for winning the GBG was a critical component that influenced the effectiveness of the game. Therefore, additional research should directly explore the effects of different parameters of prizes (e.g., immediate, delayed, no prize, choice) during the Step it UP! Game.

There are a few potential explanations for the superior effectiveness of the Step it UP! Game plus adult interaction in the present study. An increase in steps during the Step it UP! plus adult interaction sessions may have occurred due to the participants contacting immediate social positive reinforcement for MVPA in the form of the researcher's interaction and attention. Larson et al. (2013) demonstrated this effect at the individual level and we observed similar outcomes when applied to the group level (i.e., class-wide). This hypothesis is further supported by participants comments during the preference session (e.g., "It's more fun because you played"). Because adults do not typically interact with students during recess, the researcher presence may have strengthened and established adult interaction as a reinforcer for activity during Step it UP! plus adult interaction sessions. Another potential explanation is that the researcher's proximity, in order to provide immediate contingent interaction to participants engaging in MVPA, may have served as a prompt for participants to engage in MVPA. Lastly, potential histories of

reinforcement for engaging in physical activity may have also influenced the increase in steps during the Step it UP! plus adult interaction sessions. There is a potential for participants to have contacted reinforcement from an adult, in the form of attention or tangible items, for having engaged in physical activity on previous occasions (e.g., gym class, sports). A participants history of reinforcement may or may not have strengthened the likelihood that they engage in higher amounts of physical activity in the presence of an adult. Overall, the researcher's presence may have functioned as a discriminative stimulus for participants to engage in higher levels of MVPA.

There were also several interesting social-collateral responses that emerged across sessions. Collectively, throughout the implementation of intervention sessions (i.e., Step it UP! game and Step it UP! game plus adult interaction), Team 2 won a total of one time, Team 1 won a total of two times, and both teams tied a total of nine times. Throughout the length of the study participants emitted comments in relation to the games. For example, the first implementation of the Step it UP! game resulted in a tie between both teams; one participant commented, "Wow! No way!" and a second participant commented, "That's like a one percent chance!" As the implementation of both games continued and teams began to contact reinforcement in the form of prizes, participants began to make game related comments amongst each other. For example, the researcher observed a few participants making comments such as, "We have to get a lot of steps today to win." The researcher also observed participants express their preference for game sessions involving the researcher (i.e., Step it UP! game plus adult interaction) when participants made comments such as, "I love when you

get to play with us.” The collateral behaviors we observed further supports that implementation of the games along with adult interaction were preferred by the participants. The incorporation of a game and/or adult interaction to interventions to increase physical activity may be an important component worthy of future research.

LIMITATIONS AND FUTURE DIRECTION

While the overall effect of an adult interaction component during the Step it UP! game resulted in a higher level of step counts, there are some potential limitations. First, during implementation of the Step it UP! Game plus adult interaction it was difficult for the researcher to immediately identify and interact with participants who were engaged in MVPA and scattered across the play area. By not being able to immediately identify and interact with participants it was difficult to allocate adult interaction across all participants. During recess periods participants could play throughout the open area and away from the teachers and various other classrooms were also out on the play area at the same time as the participants. Future research could look to address this issue by potentially assigning a specific area for participants to play during recess periods in order for the researchers to locate participants more easily.

A second limitation of the study pertained to inactivity among participants during available recess activities involving their peers. For example, students often played games during recess that included periods of waiting for a turn (e.g., Pac Man, Scramble, and Four corners). As a result, beginning at session 9 of the study the researcher began to intermittently provide the participants with a reminder before recess (during the implementation of a Step it UP! game or Step it UP! game plus adult interaction session) that while playing games that required them to wait, they could still engage in physical activity (e.g., jogging in place, jogging back and forth, or doing jumping jacks). While providing the participants with a reminder did not

appear to influence step counts, future research may evaluate the effects of providing participants with activities they may engage in during recess that limits inactivity.

A third limitation of the study was the ineffectiveness of either of the games to produce an increase in steps among participant four, eight, 23, and 25. The step count for the four participants did not show any significant increases during implementation of the games when compared to no game. No significant increases in step counts may have been a result of the competition and/or game not functioning as a preferred activity among the 4 participants. That is, the competition component and/or the games themselves may have little to no reinforcing value to the four participants, making them non-preferred activities, and eliminating the motivation to increase step counts. Furthermore, the four participants may not have been motivated to increase step counts due to contacting reinforcement for their current step counts, in the form of their team winning. In other words, if the participants continued to engage in the same amounts of MVPA throughout the study, it may be possible for their behavior to have been intermittently reinforced when their team won a game. In addition, the prizes used in the study may not have been preferred and thus did not function as reinforcers to increase step counts. Future research may conduct participant preference assessments to identify a larger variety of reinforcing items to be used as rewards for winning, along with intermittent reinforcer assessments to prevent satiation and identify changes in preference across the school year.

A fourth limitation of the study is the feasibility of its application among teachers and/or school staff. Implementation of the study, while not difficult, may be

time consuming. Given that current teachers may have anywhere between 25-30 students in their classroom it could potentially be difficult to sustain integrity with proper implementation of the intervention due to the effort and time that is needed. Future directions may look to technology that can facilitate the efforts required in order to sustain the implementation of interventions that can increase MVPA among children in a school setting. Future researcher could also evaluate the amount of adult interaction and attention needed in order to sustain a higher level of step counts to increase the feasibility of the intervention.

Given the rise in the number of children who are overweight or obese, it is important to identify the optimal conditions that will encourage MVPA for young children. The current study extended previous research on the effects of adult interaction and attention on the amount of MVPA (Larson et al., 2013) and the effects of the Step it UP! game on children step counts (Galbraith & Normand, 2017) by comparing the Step it UP! Game with and without adult interaction on step counts of students during recess. The results of the present study suggest that adult interaction and attention is a practical and effective intervention to increase the number of steps children take during recess. The ultimate goal is for children to engage in physical activity regularly and across multiple environments; therefore, future research could evaluate effects of adult interaction and attention on step counts across multiple environments (i.e., school, home, recreational area).

REFERENCES

REFERENCES

- Barrish, H. H., Saunders, M., & Wolf, M. M. (1969). Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom¹. *Journal of Applied Behavior Analysis*, 2(2), 119-124.
doi:10.1901/jaba.1969.2-119
- Bowman-Perrott, L., Burke, M. D., Zaini, S., Zhang, N., & Vannest, K. (2015). Promoting positive behavior using the good behavior game: A meta-analysis of single-case research. *Journal of Positive Behavior Interventions*, 1-11.
doi:10.1177/1098300715592355
- Center for Disease Control and Prevention. (2018). General physical activities defined by level of intensity. Retrieved from
https://www.cdc.gov/nccdphp/dnpa/physical/pdf/PA_Intensity_table_2_1.pdf
- Efrat, M. W. (2013). Exploring effective strategies for increasing the amount of moderate-to-vigorous physical activity children accumulate during recess: A quasi-experimental intervention study. *Journal of School Health*, 83(4), 265-272. doi:10.1111/josh.12026
- Flower, A., McKenna, J. W., Bunuan, R. L., Muething, C. S., & Vega, R., Jr. (2014). Effects of the Good Behavior Game on challenging behaviors in school settings. *Review of Educational Research*, 84, 546-571.
doi:10.3102/0034654314536781
- Foote, C., Bray, M. A., Kehle, T. J., Vanheest, J. L., Gelbar, N. W., Byer-Alcorace, G., . . . Debiase, E. (2016). Interdependent group contingency to promote

- physical activity in children. *Canadian Journal of School Psychology*, 32(2), 144-161. doi:10.1177/0829573516644901
- Galbraith, L. A., & Normand, M. P. (2017). Step it up! using the good behavior game to increase physical activity with elementary school students at recess. *Journal of Applied Behavior Analysis*, 50(4), 856-860. doi:10.1002/jaba.402
- Harris, V. W., & Sherman, J. A. (1973). Use and analysis of the good behavior game to reduce disruptive classroom behavior. *Journal of Applied Behavior Analysis*, 6(3), 405-417.
- Hayes, L. B., & Camp, C. M. (2015). Increasing physical activity of children during school recess. *Journal of Applied Behavior Analysis*, 48(3), 690-695. doi:10.1002/jaba.222
- Hirsch, S. E., Healy, S., Judge, J. P., & Lloyd, J. W. (2016). Effects of an interdependent group contingency on engagement in physical education. *Journal of Applied Behavior Analysis*, 49(4), 975-979. doi:10.1002/jaba.328
- Hustyi, K. M., Normand, M. P., Larson, T. A., & Morley, A. J. (2012). The effect of outdoor activity context on physical activity in preschool children. *Journal of Applied Behavior Analysis*, 45(2), 401-405. doi:10.1901/jaba.2012.45-401
- Jung, J., Suroto, Fukugasako, Y., & Takahashi, T. (2005). The effects of group contingency strategy on students behaviors in physical education classes in

- Korea using multiple baseline design. *International Journal of Sport and Health Science*, 3, 46-56. doi:10.5432/ijshs.3.46
- Krentz, H., Miltenberger, R., & Valbuena, D. (2016). Using token reinforcement to increase walking for adults with intellectual disabilities. *Journal of Applied Behavior Analysis*, 49(4), 745-750. doi:10.1002/jaba.326
- Kuhl, S., Rudrud, E. H., Witts, B. N., & Schulze, K. A. (2015). Classroom-based interdependent group contingencies increase childrens physical activity. *Journal of Applied Behavior Analysis*, 48(3), 602-612. doi:10.1002/jaba.219
- Lalonde, K. B., Macneill, B. R., Eversole, L. W., Ragotzy, S. P., & Poling, A. (2014). Increasing physical activity in young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 8(12), 1679-1684. doi:10.1016/j.rasd.2014.09.001
- Larson, T. A., Normand, M. P., Morley, A. J., & Miller, B. G. (2013). A functional analysis of moderate-to-vigorous physical activity in young children. *Journal of Applied Behavior Analysis*, 46(1), 199-207. doi:10.1002/jaba.8
- Mayer, G. R., Sulzer-Azaroff, B., & Wallace, M. (2014). *Behavior analysis for lasting change*. Cornwall-on-Hudson, NY: Sloan Publishing.
- Shayne, K. R., Fogel, A. V., Miltenberger, G. R., & Koehler, S. (2012). The effects of exergaming on physical activity in a third-grade physical education class. *Journal of Applied Behavior Analysis*, 45(1), 211-215.

- VanWormer, J. J. (2004). Pedometers and brief e-counseling: Increasing physical activity for overweight adults. *Journal of Applied Behavior Analysis*, 37(3), 421-425.
- World Health Organization. (2018). Childhood overweight and obesity. Retrieved from <http://www.who.int/dietphysicalactivity/childhood/en/>
- Zerger, H. M., Miller, B. G., Valbuena, D., & Miltenberger, R. G. (2017). Effects of student pairing and public review on physical activity during school recess. *Journal of Applied Behavior Analysis*, 50(3), 529-537.
doi:10.1002/jaba.389

APPENDICES

APPENDIX A

STEP COUNT DATA SHEET

Step Count Data Sheet

Initials: _____ Date: _____ Session No. _____

Collector: **P** or **R** Condition: **Step it UP!** or **Step it UP!+ Int.** or **Baseline**

Before you begin to collect the step counts make sure to put your initials, the date, the session number, circle if you are the Primary (P) or Reli (R), and circle the condition being ran. Collect the pedometers from the participants as they re-enter the classroom at the end of recess. For each team, write the step count displayed on the pedometer next to its corresponding pedometer number on the lists below. Add up the total step count for each team and divide the total by the number of participants in the session.

Team 1: Orange

Pedometer #	Step Count
2	
5	
7	
9	
10	
11	
13	
16	
17	
21	
22	
23	
24	
Total:	

Team 2: Blue

Pedometer #	Step Count
1	
3	
4	
6	
8	
12	
14	
15	
18	
19	
20	
25	
Total:	

APPENDIX B

INTEGRITY CHECKLIST

Initials: _____

Date: _____

Session No. _____

Collector: **P** or **R** Condition: **Step it UP!** or **Step it UP! + Int.**

Instructions: Prior to completing the checklist begin by filling out your initials, date, session number, circling whether you are the Primary (P) or Reli (R) and circling the session condition. Complete this checklist as the primary researcher moves along each one of the components in the game. Circle **Yes** if the researcher completed the component, circle **No** if the component was not completed, or circle **N/A** if the component was not applicable.

During the *Step it UP! Game* conditions you will use Table 1. During these conditions you will wear a MotivAider set to vibrate after 15 seconds. At the end of the 15-s interval the MotivAider will vibrate and you will circle **Y** for “Yes” or **N** for “No”, in a box below, if the participants are engaging in physical activity (PA) and if the researcher is engaging in PA with them. Make sure to score participants who are with the primary researcher. If those participants are not engaged in PA, then scan other participants. Please start with the first box on the left-hand side of the first row and work your way across. When all boxes in a row are full move downward to the following row.

1. Delivered or explained pedometer rules?	Yes	No	N/A
2. Delivered or explained game rules?	Yes	No	N/A
3. Distributed pedometers?	Yes	No	N/A
4. Collected all pedometers at end of recess?	Yes	No	N/A
5. Calculated team average step counts?	Yes	No	N/A
6. Announced winning team to the class?	Yes	No	N/A
7. Delivered prize to participants after announcing winner?	<u>Yes</u>	No	N/A

APPENDIX C

POST GAME PREFERENCE SURVEY

Initials: _____ Date: _____ Collector: **P** or **R**

Before you begin to collect data make sure to put your initials, the date, and circle if you are the Primary (P) or Reli (R). Make sure all students are in the classroom at the time of collecting data. At an appropriate time go up to each individual students' desk. Ask each student quietly which condition they preferred ("Did you prefer playing no game, playing the regular game, or playing the game where the I played too?). Under the "Condition" column circle their preferred condition: **NG= no game, SIU= step it up game, and SIU+ = step it up plus adult interaction.** Next verify their choice by stating the condition they chose. Describe each game again if needed. If the student keeps their original choice, record a "+" under the "Verify" column. If the student changed their choice, record a "-" under the "Verify" column. Then ask the student why they chose the condition and write their response under the "Why" column.

<u>student #</u>	<u>Condition: Choose one</u>			<u>Verify</u>	<u>Why</u>
1	NG	SIU	SIU+		
2	NG	SIU	SIU+		
3	NG	SIU	SIU+		
4	NG	SIU	SIU+		
5	NG	SIU	SIU+		
6	NG	SIU	SIU+		
7	NG	SIU	SIU+		
8	NG	SIU	SIU+		
9	NG	SIU	SIU+		
10	NG	SIU	SIU+		
11	NG	SIU	SIU+		
12	NG	SIU	SIU+		
13	NG	SIU	SIU+		
14	NG	SIU	SIU+		
15	NG	SIU	SIU+		
16	NG	SIU	SIU+		
17	NG	SIU	SIU+		
18	NG	SIU	SIU+		
19	NG	SIU	SIU+		
20	NG	SIU	SIU+		
21	NG	SIU	SIU+		
22	NG	SIU	SIU+		
23	NG	SIU	SIU+		
24	NG	SIU	SIU+		
25	NG	SIU	SIU+		