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PHYSICAL ACTIVITY

Effect of an Elementary School Walking Program on Physical Activity and Classroom Behavior

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Abstract

This study examined the effect of a physical activity program on student activity during recess and on disruptive classroom behavior. The program was implemented during recess for 5 weeks in a rural elementary school. Prior to and during the program, teachers recorded observations of sedentary students during recess and of disruptive classroom behavior before and after recess. The number of sedentary students during recess decreased significantly during the program ($p < .05$) and classroom behavior significantly improved after recess ($p < .001$), differences that were not seen prior to the start of the program. Physical activity initiatives can improve student participation in physical activity during recess while costing little and maintaining student choice. Increased physical activity during recess improves children's ability to meet daily activity recommendations and may improve the classroom environment by decreasing disruptive behaviors.

The Physical Activity Guidelines for Americans provided by the U.S. Department of Health and Human Services (USDHHS, 2008) state that children and adolescents need a minimum of 60 min of daily physical activity (PA). The American Academy of Pediatrics (AAP, 2013) and the Centers for Disease Control and Prevention

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(CDC; USDHHS, 2008) recommend that for children and adolescents to meet these guidelines, schools provide quality physical education and recess each school day. However, an examination of school wellness policies nationally revealed that less than 7% of school districts included in the study required a set amount of time for PA during the school day (CDC, 2014). Furthermore, only three states require daily physical education and only eight require daily recess for elementary school students (Society of Health and Physical Educators [SHAPE America], 2016). In terms of scheduled physical education time, only five states plus the District of Columbia require the recommended 150 min/week of physical education in elementary school (SHAPE America, 2016). Thus, despite the myriad of health-related benefits of PA, it appears that the current academic climate and school-specific barriers limit the amount of time available for students to regularly participate in PA during the school day.

Recess has been defined as regularly scheduled periods during the school day for unstructured PA and play (CDC, 2000). In 2013, the AAP issued a policy statement citing recess as an important and necessary break from the demands of school that offers benefits for the development of the whole child. Recess is also an essential component of a Comprehensive School Physical Activity Program (CSPAP; CDC, 2013). Participation in recess has been associated with cognitive and academic benefits, social and emotional development, and increases in PA (SHAPE America, 2016). Yet current trends point to a reduction in time allotted for recess in schools, most notably driven by pressure on schools to dedicate more time to academic tasks (Evenson, Ballard, Lee, & Ammerman, 2009; Lee, Burgeson, Fulton, & Spain, 2007; Pellegrini, 2005). Additional challenges related to recess include playground conflicts and bullying, inclement weather, providing adequate supervision, and lack of adequate space and play facilities (Chicago Public Schools, 2012; Evenson et al., 2009). Students in high poverty schools and in urban settings tend to have less recess time than students in low poverty schools. Even when school policy encourages or even mandates daily recess, schools often withhold recess from students as punishment or to allow time for them to complete schoolwork. In 2006, the CDC found that 81.5% of elementary schools nationwide allowed faculty or staff to withhold recess for poor behavior (Lee et al., 2007).

Overall, researchers have found it difficult to accurately assess recess policy and trends, since recess practices vary from school to school, and even from teacher to teacher within the same school (AAP, 2013; Pellegrini, 2005).

Amid growing concerns about an increasingly sedentary youth population, recess provides schools with an important opportunity as part of a CSPAP to increase PA among children during the school day. In addition to physical and health benefits, which are well documented, a growing body of research has shown that the benefits of PA extend beyond physical health and into the classroom (AAP, 2013). Although there has been debate in the past, a meta-analysis of over 59 studies revealed a significant positive effect of PA and fitness on children's academic achievement and cognitive outcomes (Fedewa & Ahn, 2011). Aerobic activity was found to have the greatest effect, compared to other forms of activity. Even short activity breaks have been correlated with increased reading and math scores (Erwin, Fedewa, & Ahn, 2013). This is of particular interest because school performance is largely measured with standardized test scores, and administrators sometimes eliminate opportunities for PA to dedicate more time for academics.

In addition to academic achievement and performance, PA positively affects students' attention, concentration, and classroom behavior (CDC, 2010; Maeda & Randall, 2003; Mahar et al., 2006; Pellegrini, Huberty, & Jones, 1995; Pellegrini & Smith, 1993; Trudeau & Shephard, 2008). This is encouraging, since attentiveness can positively affect cognitive performance, and minimizing disruptive student behavior can positively affect the learning environment and student success (Luiselli, Putnam, & Saunderland, 2002). A minimum of 15 min of recess has been shown to improve teacher ratings of classroom behavior, attention to classroom tasks, and other academic performance indicators (Barros, Silver, & Stein, 2009; Jarrett et al., 1998; Pellegrini et al., 1995). However, not all students are physically active during recess. In one study, researchers noted that much of the time on the playground was spent socializing rather than participating in vigorous activity (Jarrett et al., 1998). It is still unclear whether simply having a break from the demands of schoolwork positively affects classroom behavior or whether some degree of PA is the mediating factor. The direct relationship between PA

during recess, classroom behavior indicators, and positive academic performance warrants further investigation.

While recess provides opportunities for children to be physically active during the school day, it should not be used for prescribed, structured PA. An important element of recess is the notion of student choice, and therefore, recess should be considered a child's personal time (Ramstetter, Muray, & Garner, 2010). However, a number of strategies promote PA during recess, including providing age-appropriate equipment, having adequate supervision, and providing semistructured activity stations (CDC, 2013). Reinforcement and goal setting have also been found to increase the number of steps that children take during recess (Hayes & Van Camp, 2015).

This study used the theory of planned behavior as a framework for developing a PA program that encourages walking and other locomotor behaviors during recess. The theory posits that individuals who have positive attitudes toward a behavior, believe that significant others are also engaging in or will support the behavior, and perceive that they have the competence and control over their behavior, develop stronger intentions and ultimately are more likely to engage in the behavior (e.g., PA; Ajzen, 1985). A number of studies exploring PA behavior support the theory of planned behavior (Chatzisarantis & Hagger, 2005; Jones, Courneya, Fairey, & Mackey, 2004; Keats & Culos-Reed, 2009; Tsorbatzoudis, 2005). While more research needs to evaluate PA interventions built upon the theory of planned behavior, it is a useful framework for developing programs that increase PA.

While studies have shown the benefits of recess, this study expands upon the literature by evaluating the effect of recess when there were concerted efforts to build a physically active recess environment that respected best practice guidelines for recess time and was minimally resource intensive. Thus, the purpose of this study was twofold. First, the study examined the effect of the PA program on student participation in PA during recess. Second, the study explored the relationship between increased PA during recess and student classroom behavior. The researchers hypothesized that the PA program would increase participation in PA and that would have a resultant positive effect on classroom behavior.

Method

Participants

All students from 27 kindergarten to fifth grade classes from a single elementary school were invited to participate in a 5-week recess PA program. Four teachers, one each from Grades 1 to 4, consented to participate in data recording for this study. The four classes included 83 students, 19% of the participating student body (441 students). The public elementary school is located in a small rural town in the southeastern United States. The demographic makeup of the school was 53% male, 47% female, 84% White, 10% Hispanic, and 5% other ethnicities, and 27% of students qualified for free and reduced lunch. The average class size was 21 students.

Instruments

Teachers recorded observations of their own class daily for 2 weeks prior to the start of the PA program and daily during the 5-week program. Observations included

- number of students sedentary for 75% or more of the recess period and
- number of behavior-based disruptive incidents in the classroom before recess and after recess.

Group-based classroom behavior was assessed on a 5-point Likert scale modified from an item from the Children's Behavior Rating Scale-Short Form (Putnam & Rothbart, 2006), with 1 representing frequent misbehavior within the group and 5 representing an exceptionally well-behaved group. Individual student behavior was not assessed, as this scale evaluated the overall classroom atmosphere. Classroom behavior was recorded twice daily: just before recess (assessing the time from the start of the school day to the start of recess) and at the end of the school day (assessing the time from return to classroom after recess to the end of school day).

Intervention

The school allotted 15 to 20 min of daily recess to each class, during which time children have free-choice outside play. During recess (both prior to and during the intervention), students have the option to participate in a variety of unstructured physical activities such as

student-organized games (e.g., kickball, basketball, tag), swinging, or playing on the play structures, track, or open areas around the playground. Students can also choose to do sedentary activities such as sitting at a table talking to their friends. During the intervention, each student was invited to spend recess time walking, running, skipping, or somehow moving around the track to earn miles toward the destination. The goal of the intervention was to encourage elementary students to choose to be more physically active during recess. To motivate students and influence their PA behavior, the program was designed around the constructs of the theory of planned behavior, which purports that an individual's behavior is predicted by his or her intentions and that behavioral intentions are determined by one's attitudes, subjective norm, and perceived behavioral control. Students were encouraged to spend part or all of their recess time engaged in walking or other locomotor activities for which they already had high levels of perceived behavioral control.

Students recorded the distance traveled while participating in these activities each day, and records were verified by the teachers. They received necklace beads for each mile recorded, which served as a token incentive and helped to influence individual attitudes and the subjective norm as they observed their peers' necklaces growing. In addition, each class was challenged to cumulatively walk the route of the Lewis and Clark expedition. Total distance traveled for each grade was displayed on a wall in the gym, serving as a friendly competition to see which grades could complete the expedition. This competition element, along with interdisciplinary activities related to the "journey" along the Lewis and Clark expedition, encouraged students to see walking as fun and connect it to their learning, thereby influencing attitudes toward PA. Teachers were also encouraged to walk during recess, which further reinforced positive attitudes and subjective norms around being physically active. This was the second year of the intervention, with only a change in the destination but not the structure of the initiative. The PA initiative was designed for outdoor activity and therefore did not occur on days when classes were required to be indoors for recess, such as bad-weather days, which accounted for 23% of class days during the 5-week program.

Procedure

The walking initiative was a 5-week program; data collection began 2 weeks prior to the intervention and continued throughout the 5 weeks. Each day teachers observed student activity during recess and recorded total number of sedentary students from their class. Sedentary students were defined as any student participating in activities that do not require physical exertion (e.g., standing or sitting and talking, socializing, playing cards or hand-clapping games) for the majority of the recess period (75% or more). Distance walked per student was recorded for programmatic purposes only. The independent variable in this study was the number of sedentary students, not distance walked. Teachers also recorded classroom behavior, the dependent variable, in the morning (start of school to start of lunch) and in the afternoon (postrecess to end of day).

Prior to the intervention, the researchers provided verbal and written training during a faculty meeting for teachers on how to use the behavior recording instrument. They also provided ongoing support throughout the intervention when teachers had questions. Responses to all questions were addressed to the entire group of teachers, which ensured that all teachers received the same instructions for use of the recording instrument.

Data Analysis

Data were analyzed using SPSS 19, with a significance level of .05. Descriptive statistics (mean, standard deviation) and inferential (paired *t*) tests for significant differences were calculated. The researchers' decision to use students as the unit of analysis despite students being nested in classes followed recommendations from Stevens (1996).

Results

Every student at the elementary school (N = 547) was encouraged to participate in the PA program. Of those, 441 (81%) chose to participate. Among the four classes participating in the research component of the project, representing Grades 1, 2, 3, and 4, 100% of students participated in the PA program at least once over the 5 weeks. Daily participation rates ranged from 70% to 100% of the students in each class. Students averaged 1.34 miles (SD = 0.46)

walked per student on each outdoor recess day, an average of 4 laps around the school's one-third-mile track around the play area. Class size ranged from 20 to 23 students. In each class, the teacher walked with the students at least some of the days. The classes had outdoor recess 16 of 23 (70%) class days during the 5 weeks of the PA program and 25 of 33 (76%) class days during the 7 weeks of data collection.

The number of sedentary students during recess decreased from a class mean of 3.37 (SD = 4.65) before the start of the PA program to a class mean of 1.41 (SD = 2.05) during the 5-week PA program, a statistically significant difference, $t(102) = -2.384$, $p < .05$. The range of sedentary students per class was 0 to 12 prior to the start of the PA program and decreased to 0 to 6 during the PA program.

Figure 1 depicts mean teacher rating of classroom behavior before and after recess, during the PA program and before it had started. For the 2 weeks prior to the start of the program, there was no significant difference in teacher ratings of classroom behavior after recess (M = 3.600, SD = 1.06) compared to before recess (M = 3.400, SD = 0.94), $t(34) = -1.871$, $p > .05$. During the program, there was a significant improvement in teacher ratings of classroom behavior after recess (M = 3.870, SD = 0.86) compared to before recess (M = 3.594, SD = 0.77), $t(68) = -4.043$, $p < .001$. There were no significant differences in behavior improvement between grade levels, $F(3, 64) = 2.013$, $p > .05$.

Because of the limited data collection period, only nine observations were made on days without an active recess period (students spent recess in the classroom, not outside or in a gym). Those observations showed no change in classroom behavior; the mean difference from before recess (M = 3.89, SD = 0.78) and after recess (M = 3.89, SD = 0.93) on those days was 0.00. The small n restricts testing for significant differences between days with an active recess and days without an active recess.

Discussion

Current trends in the United States demonstrate that childhood obesity is on the rise, while opportunities for children to be physically active during the school day are on the decline (Lee et al., 2007; Pellegrini, 2005). Thus, it is important for elementary schools to encourage PA through CSPAPs within the constraints of the school day, with recess being a prime opportunity. This study assessed the

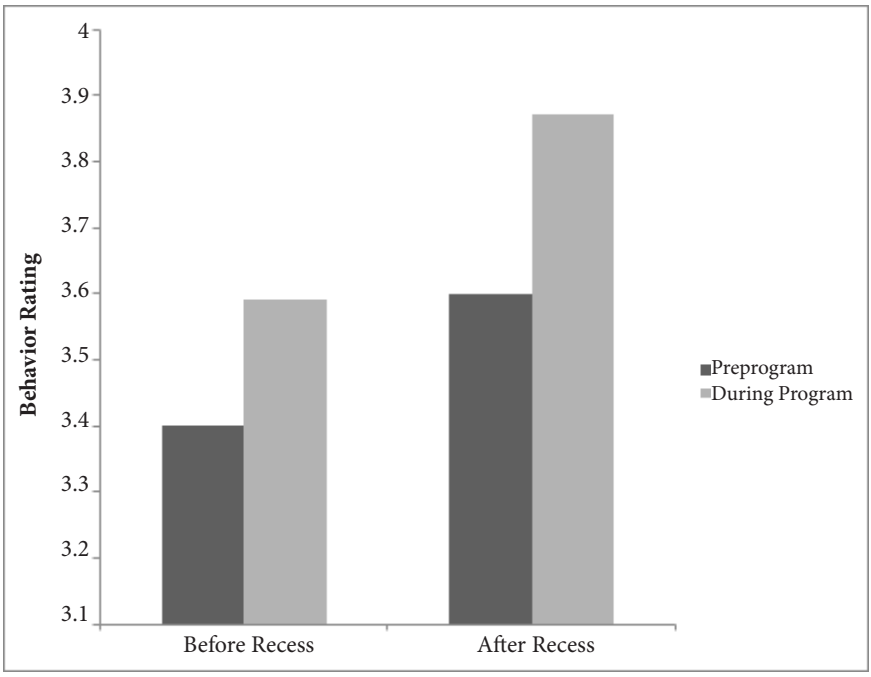

Figure 1. Mean teacher-rated classroom behavior before and after recess.

effect of an established PA initiative on participation in locomotor physical activities during recess and the resultant effect on overall classroom behavior. Data collection was positioned within the context of a 5-week PA program that encouraged and incentivized students at a rural elementary school to engage in walking or jogging for a self-selected amount of time during recess. The results of this study demonstrate the value of such a program to reduce sedentary behaviors during unstructured recess time and to positively affect the classroom learning environment.

The findings demonstrate that programmatic initiatives can increase student participation in PA during free-choice recess time and that class participation in active recess may have a positive effect on the classroom learning environment. This initiative resulted in a greater number of students participating in PA during recess, with significantly fewer sedentary students at recess during the program (M = 1.4/class) compared to prior to the program (M = 3.7/class). This represents a meaningful improvement in the number of children

who are making progress toward meeting the daily PA recommendation of 60 min/day (USDHHS, 2008).

The simple design of the program, which encouraged elementary-aged students to participate in individual locomotor activities that they had already mastered, and incentivized them to be active, added structure and encouragement for children to participate in PA during recess time without jeopardizing student autonomy. This program employed strategies such as teacher participation, class goal setting, and public reinforcement for participation (which provided individual reinforcement and influenced the subjective norm), consistent with Ramstetter et al.'s (2010) recommendation for maintaining student choice and Hayes and Van Camp's (2015) recommendation for using reinforcement and goal setting. Additionally, this program did not require additional equipment or space, rendering it sustainable and transferrable to other settings and eliminating some of the perceived barriers to recess time (Evenson et al., 2009). The simplicity and inclusivity of the activity (i.e., walking and other locomotor movements) allowed all children the opportunity to participate and experience success, without increasing opportunities for playground conflict that sometimes arise during competitive recess games.

This study examined the effect of an established PA initiative on reducing sedentary behavior and improving classroom behavior. While the constructs of the theory of planned behavior guided this initiative, the theory was the guiding framework for creating a successful program, not the focus of the research question. The positive results of this study could be extrapolated to any initiative that reduces sedentary behavior during recess and thus adapted to the preferences and needs of a variety of school settings.

Teacher ratings of classroom behavior were consistently more positive after a recess break with opportunities for PA (outside or in a gym) than before recess, prior to and during the PA program. During the PA program, more children participated in specific locomotor physical activities; thus, the researchers hypothesized that classroom behavior would be significantly better. This study demonstrated a trend toward improved classroom behavior (higher teacher ratings) during the PA program, though was unable to demonstrate a statistically significant difference. In further support of this

hypothesis, on days without an active recess period there was consistently no change in behavior (mean difference score across all grades was 0.0). This is consistent with Jarrett et al.'s (1998) findings that demonstrated a positive effect of recess time on classroom behavior. However, both studies indicate that recess alone, even without the additional programmatic initiatives for increasing PA participation, may be enough to have a positive effect on overall classroom behavior. This trend warrants further exploration over a longer time or during a different season when inactive or indoor recess is more common.

Lee et al. (2007) found that the majority of schools allow faculty and staff to withhold recess for poor behavior; however, the findings of this study indicate that withholding recess may be counterproductive. Instead, an active recess period may reduce disruptive behavior in the classroom. Taking away recess can be detrimental to the individual student who might struggle to achieve the daily 60 min of PA, and to the classroom learning environment. Therefore, schools should consider alternative disciplinary policies that do not include taking away recess. This is consistent with recommendations from the AAP (2013), the Council on School Health (2013), and SHAPE America (2016).

Elementary school administrators and faculty should deliberately ensure that students have an opportunity for active recess every school day, through policy and programmatic initiatives. Recess is essential not only for students' physical health but also for creating a classroom environment supportive to learning. Recess time positioned at midday can assist teachers and students in creating a more positive classroom environment in the afternoons. When students must stay in the classroom during recess time due to weather or other factors, active movement options should be made available. Activities such as dance, brain breaks, and hallway walking are potential options for indoor recess activities.

To further maximize the positive impact of recess, the time should be structured to encourage all students to participate in some type of physical activity, thus reducing the number of sedentary students during recess time. In this study, intentional and repeated encouragement to walk or jog proved effective in reducing the number of sedentary students during recess. Teacher role modeling and

small incentives such as sticker charts, verbal praise, class goal setting, and small cumulative rewards can further motivate students to be active. These initiatives will take some organizational effort by teachers but have relatively low financial costs. Concerted efforts by teachers to provide physically active recess periods and to encourage all students to participate in PA could serve purposes of helping individual students meet the recommended 60 min of daily PA and of improving the classroom learning environment with improved group behavior.

Limitations

While this study supports active recess from a classroom management perspective, it is not without limitations. The primary limitations of this study are the small sample size and measurement instrument, which pose serious threats to validity and reliability. The four classes that participated in data collection represented a diversity of grades (first through fourth) and a total of 83 students, which was 12% of the student body and 19% of the total number of students who participated in the PA initiative. The 83 students were members of intact classes, which resulted in a unit of analysis issue; therefore, results should be interpreted with caution. A replication study at multiple schools with many classes would be valuable such that results could be analyzed at the class level. Furthermore, the four teachers who self-selected to participate in data collection represent a potentially biased sample of teachers who have a tendency to support enrichment activities and therefore may already be influencing the classroom environment differently than other teachers do. To the extent possible, this variable was controlled for by the consistency in program administration across classes and grades. Students, whether or not their teachers were recording observations, were encouraged to participate in the same PA initiative and were given the same information and external reinforcement to be active during recess. In addition to the small sample size, the limited time for data collection presents additional challenges for comparing active recess and no recess days due to the limited number of days without recess (14% of class days during the data collection period).

Another notable limitation of this project was the measurement instrument. Group behavior recording instruments that are feasible for teachers to use in the classroom setting are virtually nonexistent.

This instrument was adapted from one item on the Children's Behavior Questionnaire-Short Form (Putnam & Rothbart, 2006) and used a Likert scale with 1 representing frequent misbehavior within the group and 5 representing an exceptionally well-behaved group. This instrument was selected for its simplicity and ease of use by teachers. The Children's Behavior Questionnaire-Short Form was developed as a parent-report, though was recently modified for use by teachers (Teglasi et al., 2015). In this study, individual student behavior was not assessed, as this scale evaluated the overall atmosphere of the classroom. Interrater reliability was not established; however, teacher training and support for using the data collection instrument was provided throughout the study. Although individual teachers may have different personal criteria and thresholds for exceptional behavior or misbehavior, each class was measured consistently by the same person (the primary teacher) every day; therefore, difference scores are accurate representations of changes in behavior even if individual teachers scored specific behavior patterns slightly differently.

A common limitation to school-based participatory research is the inability to control for confounding variables that threaten the validity of results. For example, changes in daily schedules and specific student absences can affect the classroom environment. The option for teachers to participate in the PA initiative could affect their perceptions of student behavior. Additionally, for assessment of difference in behavior between days that students did and did not have active recess, additional factors can affect behavior on days without recess. For example, the most common reason that classes did not have outdoor recess was bad weather, a factor that could independently have an adverse effect on behavior regardless of lack of recess. A strength of this study was the focus on behavior changes from before recess to after recess, which minimized the effect of some factors that would affect an entire day of instruction and thus could be accounted for by the data analysis and allow for meaningful results despite the limitations.

Conclusion

This study demonstrates the effect of recess-based PA initiatives at the elementary school level. Intentional efforts to encourage individual students to participate in locomotor activity during recess can

effectively decrease the number of sedentary students, which has individual student and classroom-level benefits. The benefit of PA on children's health is well documented, and recess can be one way that helps students reach their recommended 60 min of daily PA. Furthermore, by providing daily time for active recess, teachers can realize a more productive learning environment through improved group classroom behavior.

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