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CLASSROOM PHYSICAL ACTIVITY BREAKS

Implementation of Physical Activity Breaks in the Classroom

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Northwestern College

An Action Research Project Presented
in Partial Fulfillment of the Requirements
For the Degree of Master of Education

Abstract

The purpose of this action research study was to determine the impact of brief physical activity breaks on student engagement in the classroom, with a focus on off-task behaviors. Participants in the study were 21 seven to nine year olds who attended 3rd grade at an elementary school in Minnesota. Students completed a 3-5 minute GoNoodle guided movement video during the reading block over a 10 day intervention period. Data was collected by the researcher using a tally-mark chart to denote the frequency of off-task behaviors. The study concluded physical activity breaks had a positive effect on decreasing student off-task behaviors.

Physical activity, movement integration, student engagement

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Implementation of Physical Activity Breaks in the Classroom

Students in elementary schools today face steadily rising academic pressure, paired with increasingly less daily physical activity. In addition to sweeping policy changes, such as the passage of the No Child Left Behind Act of 2001, which lead to budget cuts and the pressure to perform well on standardized tests, resulting in the reduction, or complete elimination, of physical activity programs, physical activity has been largely pushed out of children's daily lives (Mok et al., 2020). This push is due in large part to modern ways of living, increased screen time and technology use, schools placing emphasis on academic achievement, and decreased participation in organized youth sports (Mok et al., 2020; Erwin et al., 2012; Mavilidi et al., 2020). Children spend 80-93% of their day in a sedentary, inactive state (Webster, et al., 2015), and 5-7 hours each day in front of a digital screen (Rosenkranz, 2019). With fewer than 19% of youth getting the daily 60 minutes of recommended moderate to vigorous physical activity, student health, and potentially academic success, are in jeopardy (Mavilidi et al., 2020).

“Physical activity may actually improve learning, as it enhances students’ ability to understand, retain, and apply the information they are taught” (Rosenkranz, 2019, p. 345). Children who are struggling academically may not need increased instruction time, but rather an increase in physical movement time (Rosenkranz, 2019). After various studies demonstrated a correlation between physical activity (PA) and academic achievement, the CDC concluded by allowing physical activity duration to stay the same, or even be increased during the school day, academic performance may be improved (Whitmer, 2014). The impact of adequate physical activity in children goes beyond physical health, but extends to lowered levels of anxiety, increased academic performance, muscular strength, bone strength, and self-esteem, and

reduction of risk factors for disease (Webster, et al., 2015; Mavilidi et al., 2020; Watson et al., 2017).

Of the daily 60 minutes of moderate to vigorous exercise, 30 are recommended to be completed at school (Watson et al., 2017). With the average physical education class providing 10-20 minutes of moderate-to-vigorous activity, there is still over half of the movement minutes to be accounted for throughout the school day (Rosenkranz, 2019). Schools are an ideal place for implementing more physical activity due to the robust access to children, free tuition for families, controlled environment, and the extended amount of time children spend at school (Mok et al., 2020).

The issue that arises in the classroom is a constant struggle between precious instructional time, and necessary student physical activity. Both teachers and students in primary classrooms across the country are affected by these demands. The classroom provides a unique opportunity to level the balance between academic instructional time and physical activity opportunities. One such means of increasing movement in the classroom is through physical activity (PA) breaks. PA breaks can be defined as brief stints of physical activity completed as a break from academic instruction and learning (Waston et al., 2017). One avenue of movement is video physical movement breaks such as GoNoodle in which students move along to guided exercises, dances, and movements. Furthermore, video physical activity breaks within the classroom are effective at increasing movement while being easy for teachers to implement (Mok et al., 2020).

The purpose of this action research study is to determine the impact of 3-5 minute, video-lead, physical activity breaks on the engagement of 3rd grade students. Classroom teachers can

improve their practice based on the findings of this study as results will determine the impact of PA breaks on attention, leading to a potential increase student learning. Findings from this study will inform both classroom teachers and district-level administration on the value of implementing brief activity breaks in the classroom to alleviate the tension of balancing academics with physical activity. With many experts in the education field turning their attention to the issue, there have been numerous studies conducted over the last 10 years addressing the impact of physical activity breaks in the elementary classroom on academic performance, but few regarding the impact on attention, or involving movement guided by videos of 3-5 minutes in length. This research project fills the void left by others by looking exclusively at the relationship between video guided physical activity breaks and attention.

Resources for this action research study were compiled from the DeWitt Library at Northwestern College. To be considered for inclusion, studies were current within the last 10 years, and published in a peer-reviewed journal. Studies regarding physical activity benefits, physical activity breaks, national and state school policies, school environment, and studies on the implementation of movement breaks in the classroom were reviewed. Ultimately, 20 sources were selected based on relevance and support given to the present study. Studies were used to understand the current knowledge base, as well as identify existing gaps, in the area of classroom-based physical activity breaks.

Review of the Literature

History

In order to understand the need for student physical activity breaks in the classroom, the history of policy and programming changes in schools over the last two decades must be examined. With the passage of the *No Child Left Behind Act* (NCLB) of 2001, schools began to shift a large amount of time, effort, and funding towards meeting or exceeding academic standards in reading and math, as well as closing the achievement gap between advantaged and disadvantaged students (Ladd, 2017). NCLB required all students in grades 3-8 be tested in both math and reading yearly (Ladd, 2017). The increase in testing created a wealth of data, but yielded meager results. Achievement goals were set for 100% of students to be on the track to proficiency in both content areas by 2013; the goals were rigorous, if not unrealistic, and by 2011 nearly half of all schools in the United States were not making adequate yearly progress as measured by goals set by NCLB (Ladd, 2017). The shortcomings of NCLB are well researched; in a 2012 Lee and Reaves study, there were no significant academic effects seen in math or reading, or in closing the achievement gap due to NCLB policy changes (Ladd, 2017). The Every Student Succeeds Act (ESSA) replaced NCLB in 2015 with the requirement still in place that all states test and report on all students, but gave more responsibility to state governments to design and enforce accountability systems (Ladd, 2017). Despite the replaced act, the focus remained solely on rigorous academic achievement. While academic instruction time increased, student sedentary behaviors and achievement decreased.

The unintended result of both NCLB and ESSA was a narrowed view of schooling to include only academic success on multiple-choice assessments. Schools shifted instructional time towards tested subjects and away from those subjects not assessed. According to a national

survey of 349 districts conducted in 2007, schools showed a significant increase of instructional time allotted for English and math, while decreasing time dedicated to social studies, science, art, music, physical education, and recess from the years 2001 to 2007 (Ladd, 2017). Additionally, in an attempt to meet rigorous academic standards and maximize instructional time, educators have largely adopted sedentary teaching and learning practices in which students are seated for the majority of the school day (Cline et al., 2021). As NCLB and ESSA encouraged a greater emphasis on instructional time and increased standardized test scores, there became less of an emphasis on physical activity. However, there is little evidence to show increased instructional time leads to increased test scores. Schools are left with a dilemma between achieving high, perhaps unrealistic, standards, and students who are inactive for a majority of the school day.

On the contrary, societal changes have impacted childhood activity rates. It is widely agreed upon that recent data shows a decline in childhood activity rates over the last two decades (Carlson et al., 2015; Mok et al., 2020; Stylianou et al., 2016). Aside from school policy changes, researchers argue physical activity levels are declining due to modern ways of living, increased technology use, and an increase in overall screen time for children (Mok et al., 2020). Furthermore, the balance between academics and physical activity is aggravated in rural areas in which kids are less likely to have opportunities to be physically active outside of school (Baker et al., 2017). When considering the policy and programming changes that have occurred over the last 20 years, it becomes evident children have been pushed towards more sedentary behaviors which can be detrimental to their physical, mental, and emotional health. The existing research regarding the increase in student sedentarism begins to paint a picture of a need for increasing both physical activity and learning.

Physical Benefits

Youth today face a challenge unique to the current generation: a constant challenge to maintain a healthy weight and a well-balanced lifestyle. According to the most recent CDC data, 19.3%, or 14.4 million children ages 2-19 are reported to be obese (Center for Disease Control and Prevention, 2021). The physical benefits of being active are numerous and include improved fitness levels, strengthened bones, reduced obesity, lowered blood pressure, and lowered risk of diabetes and cardiovascular disease (Mavilidi et al., 2020). Contrarily, a lack of physical activity can lead to an increased risk of obesity, type 2 diabetes, and other chronic diseases (Rosenkranz, 2020). In a study of school-based physical activity programs by Carter & Micheli (2012), researchers found a correlation between physical activity and improved peak oxygen levels as well as lowered cholesterol levels. Long term, the cardiovascular benefits obtained from rigorous exercise in childhood may lead to long-term cardiovascular benefits into adulthood (Carter & Micheli, 2012). Additionally, there has been a window of opportunity identified in which adolescents accumulate up to 26% of their total adult bone mineral mass over a period of two years between the ages of 12 and 14 (Carter & Micheli, 2012).

National physical activity guidelines for children suggest 60 minutes of moderate-to-vigorous exercise daily; 30 of which should occur during the school day (Cline et al., 2021; Rosenkranz et al., 2020; Watson et al., 2017). Sedentary learning behaviors paired with the fact that only 8% of schools nationwide provide daily physical education for the duration of the school year, provide evidence for the case that physical activity has largely been pushed out of schools (Webster et al., 2015). Additionally, the most recent United States report card regarding physical activity in school rates schools at a D- due to the fact only 20-26% of schools in the nation offer quality physical activity opportunities throughout the day (Rosenkranz et al., 2020). While physical activity levels for children drop, the physical benefits of regular movement

remain high. Researchers, educators, and other stakeholders agree more must be done to mitigate the issue of childhood obesity and sedentary behaviors.

In a quantitative United States study by Erwin et al. (2013) including 54 children ages 8-12, researchers examined student physical activity levels during indoor recess dance videos. Students participated in 5 consecutive days of indoor recess, consisting of 3-4 minute guided movement videos, played for a period of 20 minutes, while wearing accelerometers. Data was recorded from the accelerometers over the one week period. It was determined over a 20 minute indoor recess period, students spent an average of 17.66 minutes engaged in the videos, of which 22% was spent in moderate-to-vigorous physical activity (Erwin et al., 2013). Additionally, of the 20 minute period, 46% of the time was spent in light physical activity resulting in a total of 68% of time spent in some intensity of physical activity. However, the findings also determined the indoor physical activity levels were less than those previously reported for outdoor recess (Erwin et al., 2013). Classroom based physical activity breaks should not replace traditional physical education classes and/or recess, but rather are an additional way to increase student physical activity in the classroom. Implementing brief PA breaks in the classroom throughout the day, during a normally sedentary time, can add up to greater physical activity gains for students. Results of this study suggest video physical activity breaks are one effective method for increasing elementary children's physical activity. When translated to classroom practice, students can reap the physical benefits of physical activity without taking away large amounts of instructional times. Lastly, researchers in the Erwin et al. (2013) study noted a need for a variation of videos between dance, aerobics, and guided exercises, and the resulting effect on PA levels in future research; an area the researcher of this study will choose to focus on.

Cognitive Benefits

There exists a large body of research that provides evidence for the positive relationship between physical activity and cognitive benefits. Physical activity has a positive effect on the brain, which can translate to academic benefits in the classroom. Short term, immediately following PA, physical activity stimulates chemical changes in the brain which increases attention and may improve cognitive performance (Mullender-Wijnsma, 2015). In a one-year qualitative study by Mullender-Wijnsma et al. (2015), both time-on-task behavior and student motivation observed immediately following a physical movement break in the classroom were significantly increased. 228 children in 2nd and 3rd grade classes in the northern Netherlands participated in 63 physically active lessons in which they were taught 10-15 minutes of content followed by moderate-to-vigorous activity to facilitate repetition and memorization of the material. Students wore heart-rate monitors to ensure they were at the target heart-rate level for moderate-to-vigorous activity. After the one-year period, it was established the time-on-task percentage of the intervention group was found to be over 70% (Mullender-Wijnsma, 2015). Additionally, students in the 3rd grade intervention group performed higher on both math and reading assessments when compared to the control group (Mullender-Wijnsma, 2015). With time-on-task being a predictor of academic success, it can be concluded physical activity breaks are conducive to learning and engagement in the classroom.

Additional research agrees physical activity has positive effects on cognition, meta-cognition, attention, learning, and academic achievement (Baker et al., 2017; Beemer et al., 2019; Cline et al., 2021; Emeljanovas et al., 2018; Mavilidi et al., 2020; Mok et al., 2020; Rosenkranz et al., 2020). In a qualitative study conducted by Mavilidi et al. (2020), students in elementary schools across Australia received a 5-minute activity break 3 times per week consisting of combat, fitness, and cardiovascular exercises. After the 4 week period, students

receiving the PA intervention performed significantly higher in both on-task behavior and in academic scores on a math assessment (Mavilidi et al., 2020). Erwin et al. (2012) founded similar results in a quasi-experimental study in which 20+ minutes of physical activity breaks were provided to students daily in the classroom over 20 weeks. Results showed students who received PA breaks performed significantly higher on math and reading curriculum based measurement (CBM) scores (Erwin et al., 2012). The current research on physical activity points to overwhelming cognitive benefits for the brain; this easily translates into benefits for teaching and learning in the classroom.

Social-Emotional and Behavioral Benefits

The benefits of physical activity on social-emotional health and behavior is an emerging field of study in recent years. Where previous research focused on physical and cognitive benefits, emerging studies place a focus on mental wellbeing; a shift that is also felt in classrooms, schools, and in the media around the country. Such activity breaks have the power to change self-attitude, learning, and behaviors in the classroom (Emeljanovas et al., 2018). Mavilidi et al. (2020), reports physical activity can also lead to reduced levels of stress, anxiety, and depression. Rosenkranz (2020) argues when children decrease or lose physical activity time, the self-regulatory skills needed to develop skills for adulthood are effected, having the ability to hinder overall growth and development of a child. With an emphasis placed on maximizing academic instruction time, social-emotional learning is also largely pushed out of the classroom, showing additional need for student support in this area to come from elsewhere.

The aforementioned benefits are confirmed by Mok et al. (2020). In a 4 month, quantitative study including 3036 students ages 8-11, the implementation of Brain Breaks® and the effect on children's attitudes were examined. Classrooms were randomly assigned to either a

control or intervention group in which the control group received no physical activity breaks, while the intervention group received 3-5 minute Brain Breaks® twice during the school day, for 5 days each week. Each video consisted of a warm-up, movements from sports and/or traditional dances, and popular music. The videos also incorporated health and nutrition information, social-emotional learning, character building lessons, arts and culture exposure, and core curriculum aspects. Student attitudes were measured using the Attitudes toward Physical Activity Scale (APAS). At the conclusion of the study, substantial differences were seen between the two groups in the areas of self-efficacy, learning, benefits and importance of health, importance of doing their personal best, and ratings regarding fun (Mok et al., 2020). Student participation in daily PA breaks boosted scores in 6 of the 7 assessed variables; the only variable that did receive a boost as evidence from the study was BMI reduction (Mok et. al, 2020). Lastly, a large difference was found between the intervention and control groups in the area of self-efficacy; this may be due in part to the fact Brain Breaks® videos integrated social-emotional learning in addition to physical movement (Mok et al., 2020).

Likewise, a large-scale mixed-methods study by Carlson et al.(2015) set out to determine the associations between student physical activity and classroom behavior. 1132 students in grades 1-6 across 24 schools in California wore accelerometers from the fall of 2013 to the spring of 2014. Data on accelerometers, as well as teacher surveys regarding implementation of breaks and student classroom behavior, was taken in the fall and spring of the school year. Participating classrooms incorporated at least one 10 minute physical activity break into the school day. It was determined at the conclusion of the study the classrooms in which teachers reported holding regular classroom physical activity breaks, an increase of desirable student behaviors and performance in the classroom was observed (Carlson et al., 2015). Additionally,

teachers who implemented PA breaks reported fewer students lacking effort and motivation (Carlson et al., 2015). Effort and motivation are two powerful predictors of attention and time-on-task behavior, therefore it can be concluded from the study that classroom based PA breaks are a promising strategy to improve behavior and attention in the classroom.

Active Breaks

Schools are in the unique position to target a large population of students as there exists the greatest access to children regardless of race, socioeconomic status, and ethnicity in schools (Mok et al., 2020; Webster et al., 2015). On average, students spend about 30 hours per week in school (Cline et al., 2021). With the current daily recommendation for physical activity for children being 60 minutes, schools are in the unique position to provide up to 50% of the suggested guidelines for children (Cline et al., 2021; Rosenkranz et al., 2020; Watson et al., 2017). Experts agree there are many means by which to incorporate physical activity throughout the school day: transportation to and from school, recess, quality physical education classes, and expanding access to school equipment such as playgrounds and walking tracks (Baker et al., 2017; Carlson et al., 2015).

There exists a wealth of research regarding a plethora of physical, emotional, and cognitive benefits provided by the implementation of physical activity breaks in the classroom. Physical activity breaks, brain breaks, or classroom movement integration are brief, 5-10 minute breaks in which students participate in a variety of physical activity movements in the classroom, followed by a swift return to learning. Classroom based physical activity (CBPA) breaks are intended to “promote optimal learning by becoming an integral part of the classroom environment” (Emeljanovas et al., 2018, p. 581). CBPA is appealing because it is cost-effective and creates a potential for physical, cognitive, and academic benefits for children (Stylianou et

al., 2016). CBPA can consist of guided-movement videos, teacher-lead exercises, integration of movement into curriculum, or games.

The researcher in this study chose to focus on exercise videos. Digital exercise videos in particular are advantageous over teacher-led, or curriculum-based physical activity breaks in that they are effective at increasing physical activity as well as allowing for the continuity of curriculum and learning in the classroom (Emeljanovas et al., 2018). Exercise videos are effective, easy, and cost-effective for teachers to implement (Mok et al., 2020). Apps and websites such as GoNoodle allow for teachers to choose from a variety of movement videos to engage and get students moving; reaping the benefits of physical activity while remaining in close proximity to their learning.

The effectiveness of classroom PA breaks at increasing physical activity for students, as well as offering physical, emotional, and academic benefits is a well-researched field. In a quasi-experimental study by Erwin et al. (2012), 29 3rd grade students from a southeastern United States elementary school were assigned to either a control or intervention group. The intervention group received the implementation of 20 or more minutes of a classroom physical activity break while the control group received no break and continued with their in-seat learning. Data regarding reading fluency, mathematics aptitude, grades, standardized test scores, classroom behavior, and school day physical activity (via pedometers) was collected. After 20 weeks, CBMs, pedometer data, and grades all showed a significant positive effect for the intervention group. Classroom based physical activity had a significant positive effect on CBM reading and math scores (Erwin et al., 2012). The intervention group showed continual improvement of scores on CBMs when compared to the control group who peaked early in the research period (Erwin et al., 2012). Physical activity enhanced learning for students in the

intervention group – the group showed a continual improvement on CBMs versus a lack of growth in the control group (Erwin et al., 2012). Lastly, overall physical activity levels increased as demonstrated by pedometer readings (Erwin et al., 2012). It can be concluded from this study that the 20 minute PA intervention did not take away from student performance outcomes in the classroom, but rather significantly improved both reading and math scores.

The effects were mirrored in small but promising 2013 qualitative study by Bershwiner & Brusseau in which 18 students in a rural New York school participated in a two week study of the impact of classroom physical activity breaks on student overall physical activity levels. The study consisted of one week of baseline data followed by one week of the implementation of 5-15 minute physical activity breaks consisting of jumping jacks, spelling jacks, walking breaks, and classroom games, 1-3 times daily. Students wore pedometers during school hours on both weeks of the study, and height, weight, and body mass index (BMI) were calculated for each student. After the completion of the second week, it was determined the classroom based physical activity breaks did in fact increase the overall physical activity levels of students. Students increased their step count, on average, from 4806 ± 639 to 5651 ± 627 (Bershwiner & Brusseau, 2013). The amount of time students spent in moderate-to-vigorous physical activity increased by 4.6 minutes on average (Bershwiner & Brusseau, 2013). Students in all BMI categories increased their steps and overall physical activity minutes, with participants in the obese category showing the greatest increase, increasing by 997 steps, and 6.2 minutes of MVPA (Bershwiner & Brusseau, 2013). This study shows the effectiveness of PA breaks at increasing overall student physical activity levels. The results of the Bershwiner & Brusseau study further confirm previous research stating classroom physical activity breaks provide a wealth of benefits to students.

Disadvantage of Physical Activity Breaks

While physical activity breaks in the classroom are widely viewed as a positive intervention for both students and teachers, there do exist alternative viewpoints. One such disagreement is teacher hesitation. As discussed previously, educators feel an enormous amount of pressure to have all students achieving at high academic levels. The reasons educators cite as roadblocks to implementation and/or continuity of physical activity breaks in the classroom are numerous, and include, but are not limited to: lack of resources or equipment, a school policy of no running or playing in the classroom, lack of organization or teacher preparation, difficulty of students returning to work following the break, and lack of time to include breaks in the school day (Emeljanovas et al., 2018; Mok et al., 2020; Stylianou et al., 2016).

In a mixed-methods study by Cline et al. (2021), 17 teachers of 28 classes across 6 schools in Gloucestershire, United Kingdom, were participants in a study that examined the effectiveness of the implementation of Busy Brain Breaks to increase overall physical activity minutes as well as engagement in the classroom. The study included questionnaires, observations, and semi-structured interviews to determine the attitudes and ease of implementation of Busy Brain Breaks in the classroom. Teachers implemented three Busy Brain Breaks, each lasting five minutes, three times per week, for 10 weeks. After 10 weeks teachers were interviewed regarding various aspects of the intervention. The study concluded feasibility of breaks and workload were the two main concerns with including physical activity breaks in the classroom (Cline et al., 2021). This concern potentially stems from the increased academic pressure teachers feel. Additionally, teachers mentioned space constrictions in the classroom as the third most common barrier (Cline et al., 2021).

Furthermore, Baker et al. (2017) expresses more specific hurdles for children in rural areas. In a 2017 study, Baker et al. researched the impact of intentionally increasing physical activity for children in rural Missouri. A partnership between four elementary schools and the “Healthier Missouri Communities” (Healthier MO) worked to identify and address barriers to physical activity for children in their communities. It was determined schools lacked resources, and teachers lacked training and/or knowledge of implementing PA breaks in the classroom. As a result, teachers received professional development regarding the benefits, implementation, and management of brain breaks, while schools received funding to include walking tracks, playground equipment, and other physically active resources. After a one year intervention period, qualitative interviews with teachers and students along with quantitative data collected from physical activity monitors found the overall physical activity level of students increased, while behavioral issues at all four school decreased. It was determined teachers must have an interest in implementing, and knowledge of the benefits of physical activity, as well as the skills needed to implement the breaks in order for PA breaks to not be viewed as just another thing for the teacher to do (Baker et al., 2017). The most successful PA implementations occurred in the classrooms in which teachers felt supported by coworkers and administration, combined with a teacher view that the breaks were a positive asset to the classroom (Baker et al., 2017). This finding is mirrored by a 2016 study by Stylianou et al. in which 13 teachers implemented classroom based physical activity breaks for 6 months and determined the teachers who felt most supported by administration and the training teams provided by the study, were the ones who found the most success with implementing and continuing the breaks. This study shows the importance of funding, training, resources, and support to allow physical activity breaks to be successful in the classroom.

One hurdle to implementation for educators that is absent in research is the level of training on physical activity breaks provided to pre-service teachers (Webster et al., 2015; Stylianou et al., 2016). If new teachers are not trained and supported to implement PA breaks in the classroom, the breaks may be seen as just another thing to do. New teachers especially may feel increased pressure to devote the maximum amount of time to academic instruction. Encouragingly, researchers in both studies above concluded a focus on support for teachers to help implement, manage, and continue the physical activity breaks are crucial areas of future research (Cline et al., 2021; Baker et al., 2017). It can be determined from the research when teachers feel trained and supported, physical activity breaks in the classroom are much more successful.

Conclusion

After compiling all research regarding physical, academic, and social-emotional benefits of physical activity breaks in the classroom, there exists a gap in the research pointing to the need for further studies. While many studies looked at the physical, social-emotional, and academic outcomes of implementing brief physical activity, few examined the effects on attention and on-task behavior. In the Mavilidi et al. (2020) study, attention as it relates to physical activity breaks was studied, however the PA breaks were 20+ minutes long. The existing research consists of studies of physical activity breaks lasting 5-20 minutes; while this is advantageous at increasing the number of minutes students spend in moderate-to-vigorous activity, it is detrimental to instructional time. It is unrealistic to assume educators can afford a 20, or even 10 minute physical activity break in the classroom daily. Because of these gaps, more research must be conducted to examine and further study the effect of physical activity

breaks on attention and on-task behavior. The researcher in this study will choose to focus on the effects of brief 3-5 minute GoNoodle guided movement videos on attention in the classroom.

Methods

In order to determine the association between physical activity breaks and student engagement, the researcher focused on one guiding question: Does the inclusion of 3-5 minute movement break consisting of GoNoodle videos lead to an increase of engagement in the classroom? Today, children are increasingly more sedentary at school, as well as more focused on academics throughout the day. When considering the rigorous standards and increased pressure on United States schools to perform well on standardized tests, there becomes an increase of academic instructional time, and a decrease in physical movement throughout the school day. The physical, mental, and emotional benefits of physical activity are well known. The researcher seeks to determine if the implementation of physical activity breaks increase student attention as evidenced by on-task behavior.

Participants

Research was conducted at an elementary school in rural Minnesota, within a town of about 5,000 people. The district services 1,104 students in grades kindergarten through 12. The students are made up of 20% Hispanic, 0.3% American Indian/Alaska Native, 2% Asian, 2% African-American, 3% Pacific Islander, 68% White, and 4% two or more races. The district services 121 English Language Learners, and 215 students receiving special education services. In the 2020-2021 school year the free and reduced-price meal percentage was 38% but traditionally has been closer to the 50% mark. Zooming in on solely the elementary school, 340 students are serviced in kindergarten through grade 5 by 50 staff members. The elementary school has 90% of students attending school 90% or more of the year. School-wide, classrooms participate in many social-emotional support models: Morning Meeting, Responsive Classroom, PBIS, Top 20, Zones of Regulation, and trauma-informed practices.

The study took place in a 3rd grade classroom in which participants ranged from 7-9 years old. The class is made up of 21 students, 10 boys and 11 girls, of which the students are 59% White, 27% Hispanic, 9% Asian, and 5% Pacific Islander. 64% of students in the class receive free or reduced meals. Two students are on Individualized Education Plans and both receive speech therapy as well as occupational therapy. 2 students are newcomer English Language Learners and receive large daily chunks of instruction from an ELL teacher. Aside from special pull-outs, the class is self-contained and completes reading, math, writing, and social studies or science on a daily basis. The teacher in the classroom has taught for 6 years.

Data Collection

The researcher conducted a quantitative action research study in order to determine the relationship between physical activity breaks and on-task behavior. The present study took place over 5 weeks; the first 2 weeks were dedicated to gathering baseline data in which students did not receive a physical activity break, but rather continued with in-seat learning. The following 3 weeks consisted of the implementation of the PA intervention. Baseline data collection took place from September 27-October 8, with the intervention period taking place from October 11-29. Due to a shortened week of school during the intervention period, an additional week was included. During the baseline data collection, the researcher recorded and observed students during the morning reading block, and tallied off-task behaviors at a later time via a video recording.

For the purpose of this study, off-task behavior is defined as students with heads-down, redirection from teacher required, not completing assigned task, out of seat, and off-task talking. The independent qualitative variable measured is the implementation of 3-5 minute physical

activity breaks, while the dependent quantitative variable is the measurement of off-task behavior after the physical activity break is given. The dependent variable was measured by recording tally marks in an frequency chart created by the researcher. One display of off-task behavior was recorded by one tally mark in the chart. After the completion of each physical activity break, the researcher started a recording device for a 20 minute time period. In the 20 minutes, students were working independently during the reading block. The researcher took observational notes to note any outstanding factors, students, or situations occurring during the recording period. The researcher then watched the recorded footage and tallied for off-task behaviors.

Data Analysis

Using a frequency chart, tally marks were recorded for students showing off-task behavior. There is no available information regarding validity or reliability for the frequency chart as it was researcher-created, however, the researcher recorded data with fidelity. For the baseline period, off-task behavior was recorded for a 20 minute part of the reading block. For the intervention period, off-task behavior was recorded for the 20 minutes following the physical activity break. For the purpose of this study, off-task behavior is defined as students with heads-down, redirection from teacher required, not completing assigned task, out of seat, and off-task talking. The researcher took a quantitative data analysis approach when looking at the data from this study. Any great outliers in the data collection, were excluded from data analysis.

Regarding baseline data collection and analysis, the researcher totaled the tally marks from each day and determined the mode of the baseline data period. The researcher reported on the range of the baseline data as well, noting both the least and greatest number of off-task

behaviors demonstrated over the two week baseline period. Regarding intervention data collection and analysis, the researcher totaled the tally marks from each day and determined the mode of the intervention data period. In order to more clearly convey the data, the range as well as standard deviation were calculated. In order to compare the two data means, a paired-sample *t*-test was conducted, and *t* value determined. Lastly, the statistical significance of the difference in data was determined. A *p* value of less than or equal to .05 was used to qualify the findings as statistically significant. The researcher compiled the comparison of the two groups into a line plot showing the differences in data.

Ethics

Prior to starting the study, the researcher submitted a request for exemption to the Northwestern College Institutional Review Board. Due to the nature of the study being conducted in a normal educational setting in which participants were exposed to nothing beyond the normal risk present in an elementary classroom. The research of participating in 3-5 minute movement breaks within the classroom poses extremely minimal risk to the participants; students are not pushed beyond what they would normally encounter in everyday life. The IRB confirmed the exemption. Upon completion of the study, all video recordings were deleted to protect student confidentiality.

Findings

Data Analysis

In order to determine the impact of brief physical activity breaks on student engagement, data was collected using a tally mark chart. The researcher recorded a tally for any display of off-task behavior over a 20 minute period during the reading block. Baseline data was collected for 10 days, while intervention data was collected for 13 days due to a short week in the middle of the intervention period. However, due to significant outliers on days 1 and 13 of the intervention data, the two days were excluded from data analysis. Additionally, in order to create accurate data for the paired-sample t-test, the lowest frequency of behaviors on day 7 of the intervention data was excluded.

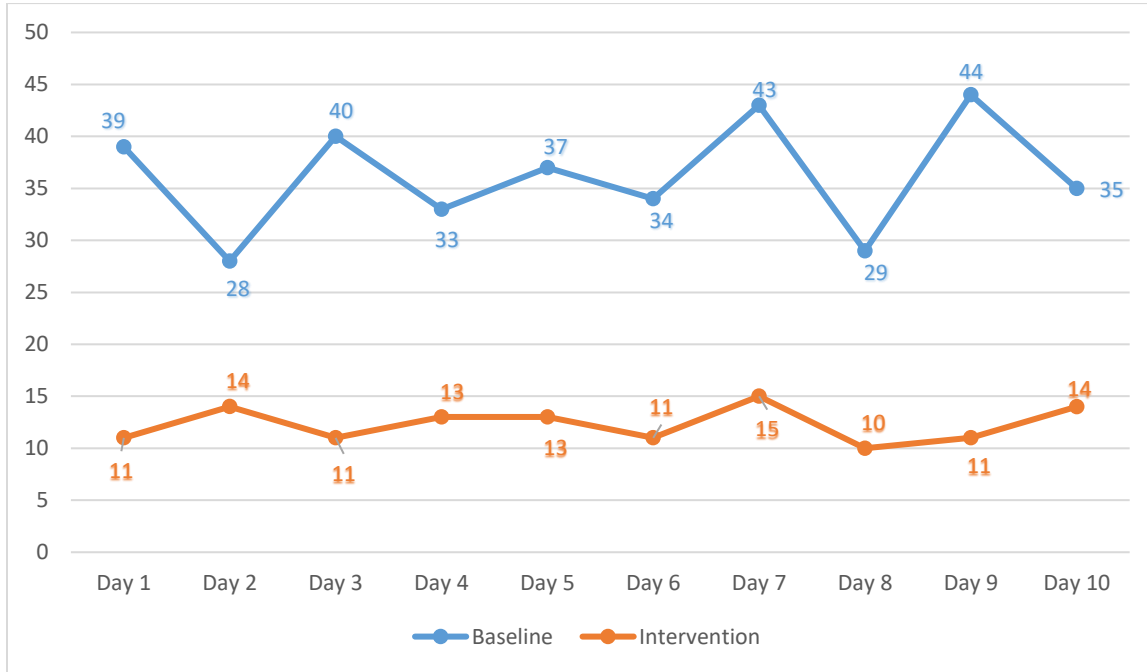
Baseline data consisting of days with no physical activity break showed a daily average of off-task behaviors of 36. The greatest number of off-task behaviors displayed during the baseline data collection period was 44, with the fewest number of off-task behaviors shown being 28. After implementing the physical activity breaks, the daily average off-task behavior frequency dropped to 12. During the intervention period, the greatest daily number of off-task behaviors exhibited was 14 on day 3, with the lowest being 10 on day 8. Figure 1 shows the comparison between baseline and intervention data of the daily frequency of off-task behaviors.

A paired-sample t-test was conducted to determine whether a physical activity break contributed to a significant change in student engagement. Two weeks of baseline data revealed an average of 36 ($M=36.2$ $SD=8.2$) occurrences of off-task behavior in a 20 minute period with no physical activity break. In the two weeks following, students participated in a brief physical activity break before returning to seat work. During this intervention period, students showed an average of 12 ($M=12.3$, $SD=1.70$) displays of off-task behavior in the 20 minutes following the physical activity break. Results of the paired-sample t-test showed a statistically significant difference between baseline and intervention data, $t(9) = 13.34$, $p < 0.001$. A p value of 0.05 was used to determine if the results of the study were statistically significant.

The data leads the researcher to conclude the implementation of physical activity breaks can lead to an increase in student engagement.

Figure 1

Physical Activity Breaks and Engagement



Discussion

Summary of Major Findings

When considering the findings of the present study, it can be concluded the implementation of physical activity breaks helped improve student engagement in the classroom. As noted in Figure 1, baseline data was collected over a period of two weeks, during which the average number of off-task behaviors was 36. During this time, students transitioned directly from whole group learning to independent seat work without any opportunities for physical movement. During the baseline data collection period, the researcher noted a restlessness about the class, as well as a more difficult time for many students focusing. The most frequent off-task behaviors exhibited during this time were off-task talking and students being out of their seat.

During the two week intervention period, the average number of off-task behaviors dropped to 12. During the intervention period, students participated in a 3-5 minute GoNoodle movement video between the transition from whole group learning to independent seat work. The videos varied in type of exercise and ranged from strenuous physical activity to mindful breathing exercises. The researcher noted when completing the strenuous activity videos, the effects were magnified, and even fewer off-task behaviors were displayed. Overall, the results of the study conclude the implementation of brief physical activity breaks can help increase student engagement in the classroom.

The findings of this study hold the potential to have a meaningful impact on both teaching and learning. The implementation of 3-5 minute physical activity breaks prove effective at increasing student engagement in a quick, easy, and cost-free method. Teachers are able to play GoNoodle videos in seconds at the click of a mouse. The videos require no preparation or planning on the part of the teacher. Time away from instruction and learning is

minimized. Videos range from 1-10 minutes, and vary in exercise type ranging from breathing techniques to intense workouts, resulting in a quick break, and one that can be altered to fit the changing needs of students daily. Lastly, GoNoodle videos are advantageous to teaching practices because they are cost-effective; there is no cost to sign up for, or play videos on the GoNoodle platform. Teaching practices and classroom environment are also improved; as the study showed, students are more focused after completing the physical activity break, resulting in students who show more readiness to learn.

When considering implications for students, the benefits of physical activity on engagement in the classroom are also great. Students complete 3-5 minutes of physical activity, and as a result, gain greater focus and ability to engage in their work immediately following the break. Students are away from their work for a minimal amount of time creating a cohesive classroom environment; only 3-5 minutes are needed to reap the engaging benefits of physical activity as evidence by the present study. With maximum time in the classroom allocated for academics, students are pushed harder than ever before; physical activity breaks provide a mental break for students, and a fun time away from their academic work.

The findings of this study echo previous studies and support the existing research regarding physical activity breaks in the classroom. Numerous studies have found evidence for the positive correlation between physical activity and benefits in the classroom on the factors of focus, engagement, and overall physical activity rates. The present study provides a more focused look at the effects, specifically, of GoNoodle videos on the on-task behavior of students, an avenue previously left out of research. The study concludes a positive correlation between physical activity breaks and student engagement in the classroom.

Limitations of the Study

While the researcher conducted a sound study, limitations of the study do exist. Throughout the implementation of the study, several factors may have skewed results. One such factor is the consistency of students in the class. The nature of the schedule at the school in which the research took place in provided an inconsistent group of students present during the study. Due to an influx of students with various needs, combined with limited spaces to provide services, students are coming and going every 10 minutes throughout the reading block. This resulted in a different configurations of students present for the intervention each day.

Another limitation of the study was of student participation. While the teacher encouraged and reminded students to move along with the video, not all students were physically active for the duration of each video. Some students stood without moving for the videos as opposed to actually moving along with the video. The students who stayed sedentary may not have reaped the physical benefits of the video which may have resulted in no change in their engagement. The researcher did not keep track of individual student engagement levels or level of participation. As a result, the data may have been skewed by including those students who did not actively participate in the video that day.

Lastly, the method of collecting and recording data was researcher-created. There exists no standardized means by which to observe and record data for student engagement with validity and fidelity. The researcher created a tally chart on which to record data. While the researcher recorded data in an ethical manner, there are sure to be flaws in the data; students may have demonstrated off-task behavior without the researcher seeing and tallying the behavior.

Further Study

Due to the short time frame of the study, a longer intervention period should be considered for future studies to determine the long-term effects of physical activity on student engagement. While the baseline and intervention periods each lasted two weeks, a longer length of study, in terms of months should be conducted. The present study showed promising short-term effects of physical activity on student engagement; a longer length of study would determine if the PA breaks completed over several months would continue to have a positive effect on student engagement.

Additionally, in future research, a control group should be included in the study. While there was baseline data collected by which to compare the intervention data, there was no control group to give a true picture of how the intervention changed student off-task behavior. In future studies, two classes, one control group, and one intervention group, should be used to determine true differences in number of off-task behaviors.

Lastly, the GoNoodle platform includes many different types of videos ranging from breathing techniques, mindfulness exercises, partner games, vigorous exercises, and many more. Future research should be conducted to determine the effect of different types of videos on student engagement. The researcher noted in this study differing effects of different videos; students were more focused after completing a vigorous exercise video, and seemingly less focused after a breathing or mindfulness video.

Conclusion

The purpose of this action research project was to determine the impact physical activity breaks have on 3rd grade students' engagement in the classroom. The findings of this study suggest physical activity breaks may have a positive impact on student engagement as evidenced by off-task behaviors. During the intervention period, students participated in a 3-5 minute guided movement GoNoodle video, followed by a 20 minute observation period in which the researcher recorded off-task behaviors. After analysis of the data, the findings of this study are consistent with the existing body of research regarding physical activity breaks in the classroom. Educators should feel confident that a few moments spent providing physical activity breaks for students will pay dividends in student engagement later.

The benefits of physical activity are numerous; the physical, social, behavioral, and cognitive aspects of a child all benefit from daily physical movement. However, a reduction of physical activity both in and outside of schools, due to policy and societal changes, has led to students become increasingly more sedentary. With classrooms today allocating the maximum amount of time towards academics, it is imperative students are participating in, and reaping the benefits of physical activity throughout their day somehow. Due to the amount of time children spend in school, as well as schools' access to the maximum amount of children, schools are in the unique position to offer children over half of the daily recommended amount of physical activity by means of quality physical education programming, recess, and physical activity breaks in the classroom (Cline et al., 2021; Rosenkranz et al., 2020; Watson et al., 2017). Physical activity breaks, such as those implemented in this study, show a promising way to promote student engagement as well as allow students to gain access to the benefits of physical activity.

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