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Pre-Class Physical Activity: Does Choice Expand its Effect on Disruptive Behavior?

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Pre-Class Physical Activity: Does Choice Expand its Effect on Disruptive Behavior?

by

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Applied Behavior Analysis
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Keywords: academic engagement, antecedent interventions, choice, classroom, disruptive behaviors, physical activity

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DEDICATION

I dedicate this manuscript to my parents, Tawn and Mark, and my sister, Lillian. Thank you for all your love and support. And to my friends and colleagues, thank you for always keeping me motivated.
ACKNOWLEDGMENTS

I would like to acknowledge and thank my thesis advisor, Dr. Catia Cividini-Motta, for her guidance and commitment to my success throughout the completion of this study. I would also like to thank Dr. Kim Crosland and Dr. Kwang-Sun Blair for their support of my research and the feedback they have given.
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ABSTRACT

Disruptive behaviors in the classroom have a negative impact on academic engagement and are related to teacher burnout (Abel & Sewell, 1999). Antecedent-based interventions have been shown to be effective in reducing disruptive behaviors (Watson, Timperio, Brown, Best, & Hesketh, 2017) without the need to interrupt academic instruction (Rosenthal-Malek & Mitchell, 1997). Physical activity is an example of an effective antecedent intervention (Lang, et al., 2010), however its efficacy may be related to the type of physical activity (Kern, Koegel, & Dunlap, 1984). The purpose of this study was to evaluate the effect of pre-class physical activity on disruptive classroom behaviors and assess whether choice of physical activity increases the efficacy of this intervention. A multiple-baseline with an embedded alternating treatments design was used. Results indicate pre-class physical activity was effective in reducing disruptive behavior and increasing academic engagement for two out three participants. Therefore, teachers should consider providing students with access to physical activity prior to academic instruction.
INTRODUCTION

Disruptive classroom behaviors negatively impact the classroom environment (Hartman & Gresham, 2016). Examples of these include talking-out, aggression, out-of-seat, off-task, noncompliance, and stereotypy (Celebreti, Bobo, Kelly, Harris, & Handleman, 1997; Folino, Ducharme, & Greenwald, 2014; Kern, Koegel, Dyer, Blew, & Fenton, 1982). Student disruptive behaviors may result in interruption of academic instruction (Austin & Agar, 2005; Hartman & Gresham, 2016, Oliver, et al., 2011), decreased academic engagement (Hartman & Gresham, 2016; Oliver et al., 2011; Stage & Quiroz, 1997) and teacher burnt out (Abel & Sewell, 1999). The impact of disruptive behavior on academic engagement is especially concerning because academic engagement correlates with skill acquisition (DiPerna, Volpe, & Elliott, 2002). In addition, students who perceive his/her own competence in academics to be high are less likely to engage in disruptive behaviors (Duchesne & Larose, 2018). Therefore, reduction in disruptive behaviors is imperative because it may lead to an increase in academic engagement and increase teacher time for academic instruction (Hartman & Gresham, 2016).

Effective procedures for the management of disruptive classroom behaviors include antecedent-based interventions (Kern & Clemens, 2007). These interventions consist of environmental manipulation to decrease the likelihood of problem behavior occurring (Kern & Clemens, 2007; Wood, Kisinger, Brosh, Fisher & Muharib, 2018). That is, these are considered preventative strategies (Wood, Kisinger, Brosh, Fisher & Muharib, 2018). Antecedent-based interventions do not require a teacher response following the occurrence of problem behavior (Wood, et al., 2018), therefore, teachers are not required to interrupt academic instruction to
provide a consequence for problem behavior. This factor makes this type of interventions potentially easier to implement (Rosenthal-Malek & Mitchell, 1997).

Antecedent-based interventions shown to reduce disruptive behaviors in the classroom include increasing predictability in the environment (Kern & Clemens, 2007), establishing rules (Kern & Clemens, 2007), interspersing difficult tasks (Skinner, Hurst, Teeple, & Meadows, 2002), and non-contingent access to physical activity (Lang et al., 2010). Physical activity has been defined as “any bodily movement produced by skeletal muscles that results in energy expenditure” (Caspersen, Powell, & Christenson, 1985, p.126). Findings of previous research has shown that physical activity has been effective in reducing challenging behaviors of persons with Autism Spectrum Disorder (ASD; Celebreti, Bobo, Kelly, Harris & Handleman, 1997; Kern, Koegel, & Dunlap, 1984; Neely, Rispoli, Gerow, & Ninci, 2015), adults with developmental disabilities (DD; Bachman & Sluyter, 1988), and typically developed children ages 8 to 11 years old (Bass, 1985). In addition, exercise has reduced a variety of topographies of problem behavior including stereotypy (Neely et al., 2015; Powers, Thibadeau, & Rose, 1992), off-task behavior (Watson et al., 2017), impulsiveness (Bass, 1985), challenging behavior (i.e., aggression, property destruction, dropping to the ground; Cannella-Malone, Tullis, & Kazee, 2011), and resulted in an increase in appropriate responses such as prosocial behaviors (i.e., helping and praising others; Folino, Ducharme, & Greenwald, 2014), on-task behavior (i.e., attending to materials appropriately; Powers et al., 1992cite), and academic responding (i.e., engaging in school-related tasks; Kern et al., 1982).

In addition, a variety of types of physical activity have been found to be effective in reducing problem behavior. For instance, results of a systematic review by Watson et al. (2017) indicated that that classroom-based physical activity, which consists of activities that the student
can complete during regular class time (i.e., jumping jacks; Ma, Mare, & Gurd, 2014), was
effective in reducing off-task classroom behavior. Furthermore, other researchers found that
physical activity completed prior to the onset of class was effective in reducing disruptive
behaviors such as stereotypy and maladaptive behaviors are observed (Lang et al., 2010; Lee,
Vargo, & Porretta, 2018), as well as increases in academic engagement and on-task behaviors
(Neely et al., 2015; Powers et al., 1992). Physical activity may also be categorized based on the
intensity of the activity (e.g., vigorous or mild; Kern et al. 1984). Higher intensity exercise (e.g.,
routing; Elliot, Dobbin, Rose, & Soper, 1994) has been shown to be more effective compared to
lower intensity exercise (e.g., walking; Elliot et al., 1994) in decreasing disruptive behavior
and/or increasing academic responding (Elliot et al.,1994; Kern et al., 1984; Lee et al., 2018).

Although physical activity has had a positive impact in the behaviors of a variety of
individuals, the efficacy of non-contingent physical activity seems related to parameters such as
duration of physical activity. In addition, the effects are temporary. For instance, research has
shown that access to physical activity until satiation, ranging from 6 to 9 min of access, is more
effective in decreasing stereotypy and increasing academic engagement than access to a brief
duration of physical activity (i.e., 1.0 - 2.6 min; Neely et al., 2015). Furthermore, findings of
previous research indicate that the therapeutic effects (i.e., reduction in problem behavior and/or
increase in appropriate responses) of access to physical activity last for approximately 40 min
(Celbreiti et al., 1997) to 90 min (Folino et al., 2014). Finally, the effects of physical activity on
target behavior do not persist once the intervention is discontinued (Nicholson et al., 2011),
therefore, continued implementation is necessary.

Another variable that appears related to the efficacy of physical activity in reducing
problem behavior is engagement in the activity. That is, higher engagement is correlated with
greater reduction in problem behavior (Nicholson et al., 2011). One way to increase engagement in the physical activity may be to provide choice of physical activities. For instance, in a study completed by Wulf, Frietas, and Tandy (2014) participants completed more exercises when they could choose the order in which they completed the exercises in comparison to participants that were given exercises in a pre-determined sequence. Similarly, Thompson and Wankel (1980) demonstrated that perceived choice of activities (i.e., believing their choices influenced the make-up of the exercise program) resulted in greater attendance in an exercise program. In addition, Ledford, Lane, Shepley, and Kroll, (2016) found physical activity (e.g., playing with toys functionally) was highest during a structured choice condition (i.e., multiple activities available plus prompts to choose one) compared to a condition without structure choice (i.e., multiple activities available but no prompts to choose one were presented. Furthermore, Prusak, Treasure, Darst, and Pangrazi (2004) measured the effects of choice of walking activities on motivation to participate in the activity and found that situational motivation, as determined using a modified Situational Motivation Scale (SIMS; Guay & Vallerand, 2000), was higher in the choice group compared to the no-choice group. However, in a study completed by Cannella-Malone, Tullis, and Kazee (2011) antecedent exercise (i.e., 20-min exercise routine completed twice a day plus hourly 1-5 min of physical activity) led to a drastic decrease in challenging behavior (e.g., aggression, property destruction, and dropping to the ground) yet the addition of a choice component (i.e., students were allowed to choose the hourly activities) did not result in further decreases in problem behavior. That is, results of this study suggest that choice of physical activity did not increase the efficacy of this intervention. Given that this study did not record data on student engagement in physical activity during the choice and no-choice phases, it is unclear if the option to choose activities resulted in an increase in engagement in physical
activity. Furthermore, it is unclear different physical activities were completed during both phases. Therefore, it possible that the lack of an effect of choice may be related to other variables (e.g., no increase in engagement; different activities available).

As noted above, disruptive classroom behaviors have a negative impact on both students and teachers (e.g., Hartman & Gresham, 2016). In addition, findings of previous research suggest that non-contingent access to exercise can reduce levels of disruptive classroom behaviors (e.g., Folino et al., 2014). However, few studies have evaluated the role of choice of exercise on the efficacy of this intervention in reducing disruptive behavior (e.g., Cannella et al., 2011). Thus, the purpose of this study was to assess the effect of pre-class physical activity on disruptive behaviors in the classroom and determine whether choice of physical activity increased the effect of this intervention.
METHOD

Participants and Recruitment Procedures

This study was completed in two public elementary schools. Participants were teachers and students from three separate 3rd grade classrooms that included students who were typically developing, classified as having Emotional and Behavioral Disorder (EBD), or identified as at risk for EBD. All students in the classroom participated in the exercise activity however only students with signed parental consent and assent participated in the selection of the physical activity. Furthermore, data were collected only on a target student per classroom. Inclusion criteria for the target students included a) disruptive behavior during at least 30% of academic instruction, b) willingness to participate in physical activity, and c) no medical issue that precludes participation in physical activity. Exclusion criteria for the target students included a) engaging in severe problem behavior that poses a risk of injury to themselves, the researchers, or the environment, b) frequent problem behavior when asked to do physical activity (i.e., during Physical Education class), and c) frequent school absences. To determine if a student met the participation criteria the primary investigator (PI) conducted an interview with the student’s teacher using a teacher interview form (Appendix A) and also observed each student nominated by the teacher for 60 min. Teacher participation criteria consisted of a) serving as the primary teacher for a class that includes students who met participation criteria (see above), and b) willingness to allocate 5-15 min of class schedule to allow students to engage in physical activity prior to academic instruction.
Teachers were recruited through flyers that the PI emailed to principal of each school containing the purpose of the study, participant inclusion criteria, and the PI’s contact information (Appendix B). Once the principal approved, a meeting was completed with either the assistant principal or behavior specialist from each school to identify teachers with interest in the study who may have students that met the inclusion criteria. Then a meeting with each teacher was conducted to discuss details of the study, consent was then obtained and a teacher interview (Appendix A) was conducted where the teacher nominated up three potential students to serve as the target student. The three teachers participating in this study were Mrs. Marshall, Mrs. Brown, and Ms. Cooper. Each teacher was the primary teacher for the target student and worked with that student throughout the school day. Mrs. Marshall, who was Jane’s teacher, had been teaching for 9 years and had known the target student for 4 months prior to the study. Mrs. Brown, who was Jacob’s teacher, had been teaching for 3 years and had known Jacob for 1 year and 4 months prior to beginning the study. Ms. Cooper, Mark’s teacher, had known Mark for 1 year and 4 months prior to the study and had been a teacher for 4 years. All three were certified teachers.

Once consent from the teacher was attained, parental consent forms were sent home in the backpacks of all students in the classes of the participating teachers. Then the PI conducted the initial observations for each of the students nominated by the participating teachers. Both Mrs. Marshall and Mrs. Brown nominated only one student, Jane and Jacob, respectively. Ms. Cooper nominated three students initially, including Mark, but because one of them was scheduled to move to another school he was not considered for this study. The PI observed the remaining two students. The initial observations indicated that, on average, Mark engaged in higher levels of disruptive behavior compared to the other student therefore Mark was selected to
participate in this study. Once parental consent was received, student verbal assent was obtained for all students for whom written parental consent was attained. Verbal assent was obtained using a verbal script approved by the Internal Review Board (IRB).

The three target students in this study were Jane, Jacob, and Mark. Jane was a 9-year-old girl in a general education classroom. She was identified by the teacher as at-risk for EBD due to frequent disruptive behavior including calling-out, out of seat behavior, and task refusal. Jane was observed for 60 min divided across four different observations, once during math, once during science, once during independent reading with a book, and once during independent reading on a computer. Each observation lasted 15 min. Jane engaged in disruptive behavior in 60% of the observation period during math, 17.8% of the observation during science, 70% of the observation during independent reading with a book, and 56.6% of the observation during independent reading on the computer. Jane’s teacher reported that independent reading with a book was not part of Jane’s typical routine, therefore, this period was not considered for the target observation period. Given these data, math was chosen as the target observation period for Jane.

Mark was a 10-year-old boy also in a general education classroom identified by the teacher as at-risk for EBD due to frequent disruptive behavior including calling-out, out of seat behavior, and task refusal. Mark was also observed four times, in math, science, social skills, and reading, and each observation lasted for 15 min. Mark engaged in disruptive behavior during 88%, 41.1%, 51.1%, and 73.3% of the observations completed during reading, science, math, and social skills, respectively. Given these data, reading was chosen as the target observation period for Mark.
Jacob was a 9-year-old boy in an EBD classroom and classified as having an EBD. During the initial interview his teacher indicated that he frequently engaged in frequent disruptive behavior including calling-out and task-refusal. Jacob was observed three times, once during math in the morning, once during math in the afternoon, and once during language arts. During the morning math class Jacob engaged in disruptive behavior for 63.3% of the 30-min observation period. During the afternoon math class Jacob engaged in disruptive behavior during 66.6% of the 15-min observation period. Finally, during the 15-min observation of language arts he engaged in disruptive behavior during 25% of the observation. Given these data, math was chosen as the target observation period for Jacob.

Materials and Setting

Materials needed for this study included data sheets, clipboard, pen, smartphone, and YouTube videos. Additional materials included voting ballots for the students to indicate their choice of physical activity, a small bag used to hold the completed ballots, and laptop with projector screen. Laptop and projector screen were materials already in the classrooms. The smartphone was used to collect data using the Countee© application and the Periodic Timer© application. All the physical activity videos used were YouTube videos displayed on a laptop or on a projection screen using a laptop.

The study was completed in two public elementary schools. All observations were completed in the classroom. Two classrooms were general education classrooms and one was an EBD classroom in a self-contained unit. Both Mrs. Marshall’s, Jane’s teacher, and Ms. Cooper’s, Marks’s teacher, taught general education classes. There was a total of 22 students in Mrs. Marshall’s classroom and parental consent was attained for 15. In Ms. Cooper’s class there were a total of 24 students and parental consent was received for 16 of them. Mrs. Brown’s, Jacobs’s
teacher, class was an EBD class with seven students and parental consent was received for four of them. Each target student was observed during the subject correlated with the highest occurrence of disruptive behavior as indicated by teacher report and data from the initial observations. Both Jacob and Jane were observed during math and Mark was observed during reading. Math and reading lasted for approximately 60 min. The academic instruction for all students included the teacher providing a lecture as well as modeling how to do the problems/answer the questions along with all students in the classroom. This also included students working on academic material independently and the teacher sometimes providing individual instruction to student.

**Dependent Variables**

The dependent variables for this study included each student’s target disruptive behavior(s) and academic engagement. Data were collected by the PI or trained research assistants (RAs). The PI trained RAs by having them collect data on the dependent measures until agreement on the data collected by the RA and PI was at least 90% for a session. Data were recorded either by measuring continuous duration via the Countee© Application or using interval recording. Continuous duration of engagement in physical activity for Jane and Mark was measured via the Countee© application. Interval recording was used to measure disruptive behavior and academic engagement for all participants and engagement in physical activity for Jacob.

Disruptive behavior was operationally defined for each student based on data attained during the teacher interview and during the initial observations. For Jacob, disruptive behavior consisted of calling out, out-of-seat, task refusal, loud vocalizations, and disruptive noises. Disruptive behavior for Jane consisted of calling out, out-of-seat, task refusal, property
destruction, and disruptive noises. Disruptive behavior for Mark consisted of calling out, out-of-seat, task refusal, and disruptive noises. The definition of task refusal, disruptive noises, and calling out was the same for all three participants. Task refusal consisted of engaging in any other behavior other than the teacher-directed activity for 3 sec or longer. Disruptive noises consisted of making a sound with mouth, vocal cords, body and/or objects (e.g. using fists to bang on the desk, slamming books shut, and stomping feet on the ground) that was heard more than 10 ft away. Calling out was defined as speaking out of turn (e.g., talking when the teacher called on another student, talking while the teacher is talking to another student), talking without raising hand first and/or raising his hand and talking prior to being called on, speaking louder than a conversational tone, and talking while the teacher is talking, or talking to peers about nonacademic-related topics. Out-of-seat behavior for Jacob and Mark was defined as any instance in which the student’s bottom was not in contact with the seat of the chair for 3 sec or longer, without gaining teacher permission. Given different expectations from teachers, out-of-seat behavior for Jane consisted of any instance in which Jane’s lower half of her body was not in contact with the seat of the chair for 3 sec or longer, without gaining teacher permission. Finally, Jane’s property destruction included any instances of Jane ripping or break an item, throwing an item, or defacing items (i.e., drawing on inappropriate surfaces).

Data on disruptive behavior were recorded using a 10-s partial interval recording system (Appendix C). Students were observed during their respective subjects for which they engaged in the most disruptive behavior for approximately 30 min (range: 24.5 to 30 min). An occurrence (+) was scored if the student engaged in any of the operationally defined behaviors at any point during the interval. A nonoccurrence (-) was scored if the student did not engage in any of the operationally defined behaviors for the entire interval. These data were summarized as the
percentage of intervals with disruptive behavior by dividing the sum of the intervals scored with each target behavior by the total number of intervals, and multiplied by 100.

Academic engagement consisted of a combination of a) sitting at assigned seat unless given permission to stand up, b) raising hand and/or saying the teacher’s name and waiting for permission prior to speaking to teacher and/or classmate, c) talking at appropriate volume d) participating in assigned classroom activity following instructions. All of these must occur in the absence of problem behavior. Academic engagement was measured using a 10-s whole interval recording system (Appendix C). Students were observed for approximately of 30 min (range: 24.5-30 min). An occurrence (+) was scored if the student was academically engaged during the entire interval. A nonoccurrence (-) was scored if the student was not academically engaged at any point during the interval. These data were summarized as the percentage of trials with academic engagement by dividing the sum of the intervals scored with each target behavior by the total number of intervals, and multiplied by 100.

Finally, engagement in physical activity was operationally defined for each activity. For Jacob, the activities available were jumping jacks, jogging in place, and following an exercise video. For Jane and Mark, the activities available were a yoga video, a dance video, and three different types of exercise videos. These activities were selected because they are classified as moderate-to-vigorous intensity levels as determined by the PI using the “talk test” (Centers for Disease Control and Prevention, 2020), they could be completed within the classroom, did not require additional equipment (e.g., balls and jump ropes), and they were approved by the teacher. Furthermore, the videos used were directed towards a children audience (i.e., depicting children doing the physical activities or the video description stated it was for children). Jumping jacks were defined as jumping into a position with the legs spread and placing the hands overhead, and
then returning to a position with the feet together and the arms at the sides. Jogging in place was defined as bending elbows and knees while lifting feet off the ground by alternating between the left and right foot, in a continuous motion to resemble a steady run while staying within proximity of the initial starting point. Completion of the video activity consisted of continuously (i.e., not stopping for longer than 3 sec) moving body in positions to resemble the positions displayed by the people in the exercise video.

Data on engagement in physical activity for Jacob were collected using 10-s momentary time-sampling (MTS; see Appendix D). In this case, at the end of each interval the PI or RA assistant observed the student for 2 s and record the occurrence or non-occurrence of the target behavior during that 2-s observation. An occurrence (+) was recorded if the student was engaging in physical activity at the end of the interval. A nonoccurrence (-) was scored if the student was not engaging in physical activity at the end of the interval. These data were summarized as the percentage of intervals with engagement in physical activity by dividing the sum of the intervals scored as an occurrence by the total number of intervals and multiplied by 100. For Jane and Mark data on continuous engagement in physical activity were recorded via the Countee© Application and percentage of session with engagement was calculated by dividing the total duration in seconds of engagement by the total duration in seconds of the observation period then multiplied by 100.

Social Validity

Teacher acceptability of the procedures and satisfaction with the outcomes was assessed using an adapted version of the Intervention Rating Profile (IRP; Martens, Witt, Elliott, & Darveaux, 1985). The form consisted of 10 questions answered using a five-point Likert scale (Appendix E). A score of 1 on the scale indicated “strongly disagree” and a score of 5 indicated
“strongly agree.” Student social validity was assessed using a questionnaire consisting of 4 items (Appendix F). The questionnaire was developed by the researcher. The questions were vocally answered by the student using “yes” or “no.”

**Interobserver Agreement (IOA) and Procedural Integrity**

IOA was assessed by having a trained RA independently but simultaneously collect data on the dependent measures for an average of 32.3% of the sessions across all conditions and participants. For disruptive behavior, academic engagement, and engagement in physical activity, IOA was calculated either using the proportional agreement method or by calculating the number of intervals with agreement. In the proportional agreement method, sessions were divided into 10-s bins and agreement scores were calculated for each interval by dividing the smaller number by the larger number. Then these scores were added and divided by the number of bins in the session, multiplied by 100. For the interval method, the total number of intervals with agreements was divided by the total number of intervals in the session, and multiplied by 100. IOA for Jacob was assessed for 35.3% of sessions and the mean agreement score was 90.2% (range: 78.3-100%). For Jane IOA was calculated for 36.4% of sessions and mean IOA was 76.3% (range: 50-90.7%). For Mark IOA was calculated for 25% of the sessions and the average IOA was 89.6% (range: 88.3-91%). Additional IOA scores for each participant are shown in Table 1.

Procedural integrity of the PI’s correct implementation of the procedures was assessed using a checklist (Appendix G). Trained RAs collected procedural integrity for an average of 32.3% of sessions across participants and phases. Procedural integrity scores were calculated by dividing the number of steps completed correctly by the total number of steps, multiplied by 100. The procedural integrity score was 100%.
Experimental Design

A non-concurrent multiple-baseline across participants with an embedded alternating treatments design was used to determine the efficacy of antecedent physical activity on disruptive behaviors and academic engagement in the classroom. During intervention, the conditions were alternated in rapid succession of one another. Sessions were alternated between a choice and no-choice condition.

Procedure

Observations were conducted during the same selected academic instruction period for each student. Each student was exposed to three conditions, baseline, choice, and no-choice conditions. In the choice and no-choice conditions students were given the opportunity to participate in physical activity prior to academic instruction period. Intervention was continued until disruptive behaviors decreased and academic engagement increased to acceptable levels as determined by baseline levels and teacher input. Sessions were completed until there was differentiation across the treatment conditions or data suggested that both were equally effective.

Baseline. During baseline, students were directly observed during the predetermined academic instruction time for approximately 30 min (range: 24.5-30 min). The teacher was instructed to conduct her academic instruction as she typically would outside of the study. The academic instruction for all students included the teacher delivering a lecture as well as modeling to the entire class how to complete the assigned problems or questions. During some lectures students worked on activities independently and during these times the teacher occasionally met with students individually to review the material. If disruptive behavior occurred, all three teachers intervened by using a combination of redirection (e.g., vocal redirection to task or desk), reminders (e.g., reviewing classroom expectations), planned ignoring, or verbal reprimands. In
Jacob’s classroom a level system was in place where students were assigned points contingent on the occurrence of problem behavior and moved down a level upon receiving a specified amount of points. In addition, lack of points resulted in moving up a level. A certain number of points resulted in being moved down a level and a lack of points resulted in being moved up a level. Each level of the system was associated with certain privileges for the students on that level and the level system was in effect throughout all phases of this study. The class was not scheduled to participate in any physical activity during the hour prior to the scheduled research observations and prior to beginning an observation the PI asked the teacher whether the class had participated in any physical activity in the preceding 45 min.

**Pre-Class Physical Activity.** To assess the effect of physical activity on disruptive behavior and academic engagement students were given the opportunity to participate in 5 min of a moderate-to-vigorous physical activity. Moderate-to-vigorous intensity was determined using the “talk test.” For moderate-intensity a person can talk but not sing while doing the activity and for vigorous-intensity a person cannot say a few words before pausing to breath (Centers for Disease Control and Prevention, 2020). Physical activities provided for Jacob were jogging in place, jumping jacks, and an exercise video depicting various exercises (e.g., push-ups and windmills). For Jane and Mark, five physical activities videos were provided. These videos consisted of a yoga, dance, and various exercises (e.g., jumping jacks and push-ups). The PI selected the physical activity types based on school resources and teacher input. The same activities were available in the choice and no-choice conditions. During the physical activity sessions, the PI instructed the students to participate in the target activity by providing a brief vocal prompt, “It is time to “x”, play as much as you want.” However, students were allowed to take breaks and/or stop participating in the activity at any point.
Choice Condition. During the choice condition, students chose one type of physical activity from a predetermined list of three or five physical activities. Each student whose parent consent was received was allowed to vote for an activity. Students were called one-by-one by the PI and told to select and activity either by circling an activity on a piece of paper or writing down number associated with an activity. Each vote was then placed in a bag and the PI selected a vote out of the bag and announced which activity the students would engage in. This voting procedure was done in the both the choice and no-choice condition. For the choice condition the PI announced the activity chosen by the target student. Physical activity choices were presented as a written list of activities for Jacob and picture-based menu for Jane and Mark. The PI recorded the activity chosen by the target student.

No-Choice Condition. During the no-choice condition for Jacob, one of the activities from the predetermined list was randomly selected by the PI and that physical activity was presented to the students. Each type of physical activity from the list was assigned a number, and then an online random number generator was used to select a number that was assigned to a physical activity type. This ensured randomization. For Mark and Jane, activity selection in the no-choice condition was yoked to the choice condition (i.e., the activity chosen by the target student in the previous condition was the same activity presented to the students in the subsequent condition). The list of physical activities for each student were the same activities presented to the student during the choice condition. The PI recorded the activity presented to the students.
RESULTS

Disruptive Behaviors

Figure 1 displays data for all three participants across baseline and intervention phases. During baseline, Jane engaged in moderate to high levels of disruptive behavior and prior to the intervention disruptive behavior was occurring on an increasing trend. Jane engaged in disruptive behavior on an average of 56.7% (range: 41.1-76.1%) of intervals during baseline. Once pre-class physical activity was introduced Jane engaged in low to moderate levels of disruptive behavior and the data were stable in this phase. During intervention Jane’s disruptive behavior decreased to an average of 35.9% (range: 29.3-42.2%) in the choice condition and to 32.2% (range: 23.9-41.1%) in the no-choice condition. That is, disruptive behavior decreased from baseline to the choice and no-choice conditions by 36.7% and 43.2%, respectively. During baseline, Mark engaged in variable but moderate levels of disruptive behaviors. Mark engaged in disruptive behavior on an average of 47.2% (range: 34.4-58.3%) of intervals during baseline. Once pre-class physical activity was introduced Mark’s disruptive behavior decreased to an average of 44.4% (range: 31.7-57.2%) in the choice condition and to 41.1% (range: 31.7-50.6%) in the no-choice condition. That is, disruptive behavior decreased from baseline to the choice and no-choice conditions by 6% and 13% respectively. However, data collection is ongoing for Mark. During baseline, Jacob engaged in low to moderate levels of disruptive behavior and prior to the intervention disruptive behavior was occurring on an increasing trend. Jacob engaged in disruptive behavior on an average of 45.3% (range: 25.5-57.8%) of intervals during baseline. Once pre-class physical activity was introduced, Jacob’s disruptive behavior decreased and
occurred at low to moderate levels. During the intervention phase Jacob’s disruptive behavior decreased to an average of 21.3% (range: 14.5-35%) in the choice condition and to 27.8% (range: 21.7-39.9%) in the no-choice condition. That is, disruptive behavior decreased from baseline to the choice and no-choice conditions by 52.9% and 38.6%, respectively.

**Academic Engagement**

Figure 2 displays data for all three participants across baseline and intervention phases. During baseline, Jane engaged in moderate to low levels of academic engagement and prior to the intervention academic engagement was occurring on a decreasing trend. Jane’s academic engagement occurred on an average of 43.3% (range: 23.9-58.9%) of the intervals during baseline. Once pre-class physical activity is introduced, Jane’s academic engagement increased to an average of 64.1% (range: 65-70.7%) of intervals in the choice and 67.8% (range: 58.9-76.1%) of intervals in the no-choice conditions. That is, academic engagement increased from baseline to the choice and no-choice conditions by 48% and 56.6%, respectively. During baseline, Mark engaged in variable but moderate levels of academic engagement. Mark’s academic engagement occurred on an average of 52.8% (range: 41.7-65.6%) of intervals during baseline. Once pre-class physical activity was introduced, Mark’s academic engagement increased to an average of 55.5% (range: 42.2-68.3%) of intervals in the choice and 58.8% (range: 49.4-68.3%) in the no-choice conditions. That is, academic engagement increased from baseline to the choice and no-choice conditions by 5.1% and 11.4%, respectively. Data collection is ongoing for Mark. During baseline, Jacob engaged in variable levels of academic engagement, ranging from moderate to high levels. Jacob’s academic engagement occurred on an average of 54.7% (range: 42.2-74.4%) of the intervals during baseline. Once pre-class physical activity is introduced, Jacob’s academic engagement increased to high and stable levels. Jacob’s academic
engagement occurred on an average of 78.7% (range: 65-85.5%) of the intervals in the choice and 72.2% (range: 60.1-83.3%) of the intervals in the no-choice conditions. That is, academic engagement increased from baseline to the choice and no-choice conditions by 43.9% and 32% respectively.

**Engagement in Physical Activity**

Figures 1 and 2 displays the same data for all three participants across intervention phases. Once pre-class physical activity was introduced, Jane engaged in high levels of physical activity. Jane engaged in physical activity on an average of 86% (range: 73-97%) of the sessions during the choice condition and 87.2% (range: 74.7-96.3%) of the sessions during the no-choice condition. Mark engaged in physical activity on an average of 51.2% (range: 4.4-98%) of intervals in the choice condition and 87.5% (range: 87.5-90.5%) of the intervals in the no-choice condition. Jacob engaged in low to high levels of physical activity and he engaged physical activity on an average of 39.3% (range: 16.7-53.5%) of the session in the choice condition and 60% (range: 10-100%) of the session in the no-choice condition.

**Social Validity Data**

Social validity data collection is ongoing. Table 4 displays results of the social validity questionnaire completed by one of the teachers. The questionnaire was adapted from the IRP questionnaire (Martens et al., 1985) and consisted of 10 questions that were answered using a 5-point Likert scale ranging from 1 (disagree) to 5 (agree). Teachers completed the questionnaire at the end of the study. The mean score for Mrs. Marshall was 4.8 (range: 4-5). The mean score for Ms. Cooper was X (range: X-X) and the mean score for Mrs. Brown was 5 (range: 5). The results from the social validity assessment indicated that the teachers found the intervention to be acceptable, feasible, and effective. Additionally, the target students also completed a 4-item
questionnaire by vocally answering using Yes or No. Table 5 displays the social validity
questionnaire completed by one of the students. Jane answered “Yes” on 75% of the questions,
Mark on X% of the questions, and Jacob on 25% of the questions. Overall, the results suggest
that all three students liked the intervention, would like to continue doing it, and preferred to
choose an activity.
Figure 1. Percentage of intervals with disruptive behavior during academic instruction and percentage of session/intervals with engagement in physical activity during choice and no-choice conditions for all participants across all phases. Activities available during the choice and no-choice conditions were yoked for Jane and Mark.
Figure 2. Percentage of intervals with academic engagement during academic instruction and percentage of session/intervals with engagement in physical activity during choice and no-choice conditions for all participants across all phases. Activities available during the choice and no-choice conditions were yoked for Jane and Mark.
Table 1

Mean percentage of IOA per participant and per conditions

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB Mean</td>
<td>AE Mean</td>
<td>DB Mean</td>
<td>AE Mean</td>
<td>EPA Mean</td>
<td>DB Mean</td>
<td>AE Mean</td>
<td>EPA Mean</td>
<td></td>
</tr>
<tr>
<td>Jacob</td>
<td>% of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>IOA score</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>79.1 (78.3-80)</td>
<td>79.1 (78.3-80)</td>
<td>88.6 (84.4-88.9)</td>
<td>88.6 (84.4-88.9)</td>
<td>98.4 (96.7-100)</td>
<td>86.6 (87.3-90)</td>
<td>86.6 (87.3-90)</td>
<td>98.4 (96.7-100)</td>
<td></td>
</tr>
<tr>
<td>Jane</td>
<td>% of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>71.6 (61.1-82.2)</td>
<td>71.6 (61.1-82.2)</td>
<td>76.1 (76.1)</td>
<td>97.1 (97.1)</td>
<td>90.7 (90.7)</td>
<td>90.7 (90.7)</td>
<td>50 (50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mark</td>
<td>% of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>IOA score</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>89.6 (88.3-91)</td>
<td>89.6 (88.3-91)</td>
<td></td>
<td></td>
<td>82.2 (82.2)</td>
<td>82.2 (82.2)</td>
<td>68.1 (68.1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. DB: Disruptive behavior; AE: Academic Engagement; EPA: Engagement in Physical Activity.
Table 2

*Mean percentage of PI per participant and per conditions*

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Choice</th>
<th>No-Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DB Mean</td>
<td>AE Mean</td>
<td>DB Mean</td>
</tr>
<tr>
<td>Jacob</td>
<td>% of sessions</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>PI score</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Jane</td>
<td>% of sessions</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>PI score</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Mark</td>
<td>% of sessions</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PI score</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note.* DB: Disruptive behavior; AE: Academic Engagement; EPA: Engagement in Physical Activity.
Table 3

*Teacher Social Validity Questionnaire Results*

<table>
<thead>
<tr>
<th>Questions</th>
<th>Mrs. Marshall</th>
<th>Mrs. Brown</th>
<th>Ms. Cooper</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>This was an acceptable intervention given the target student’s disruptive behavior</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This intervention led to a decrease in the target student’s disruptive behavior</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Most teachers would find this intervention appropriate for disruptive behavior</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would recommend this intervention to other teachers</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I would be willing to use this intervention in the classroom setting with other students</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This intervention would be appropriate for a variety of children and classrooms</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This intervention was a fair way to handle the problem behavior in my classroom</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I liked the procedures used in this intervention</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>This procedure is not too difficult or costly to implement</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall, this intervention was beneficial for the students in my classroom</td>
<td>4</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Each question was answered using a 5-point Likert scale. A 1 indicated disagree, 2 indicated slightly disagree, 3 indicated neutral, 4 indicated slightly agree and 5 indicated agree.
Table 4

*Student Social Validity Questionnaire Results*

<table>
<thead>
<tr>
<th>Questions</th>
<th>Jane</th>
<th>Jacob</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>I liked doing physical activity before class</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>I want to continue physical activity before class</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>I liked the types of physical activities we did</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>I prefer to choose an activity</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
</tbody>
</table>
DISCUSSION

This study evaluated the effect of pre-class physical activity on disruptive behaviors and academic engagement and also assessed whether choice of physical activity increased the efficacy of this intervention. Participants were three elementary-aged students, one identified as having EBD (Jacob), and two identified as at-risk for EBD (Mark and Jane). In this study, pre-class physical activity led to a decrease in disruptive behaviors and an increase in academic engagement for two out of three participants, Jane and Jacob. For the third participant, Mark, data collection is ongoing, however, thus far pre-class physical activity has not impacted levels of disruptive behaviors or academic engagement. Also, there were no differences in the levels of disruptive behaviors and academic engagement in the choice condition compared to the no-choice condition for all three participants. In addition, the three participants engaged in the physical activity at varying levels. Jane engaged in physical activity at high levels, Jacob at moderate levels, and Mark at variable levels. Levels of engagement in physical were similar across the choice and no-choice condition and no activity was consistently associated with higher engagement for any of the participants.

Results of the current study in regard to the impact of pre-class physical activity on disruptive behavior and academic engagement consistent with previous research demonstrating that non-contingent physical activity can be effective in decreasing disruptive classroom behaviors (Folino et al., 2014; Neely et al., 2015) and increasing academic engagement (Neely et al., 2015; Nicholson et al., 2011). However, the procedures employed in the current study differ from those used in previous studies. For instance, Neely et al. (2015) compared varying
durations of physical activity and found that exercise until satiation was the most effective
duration. In the current study, each participant was given 5-min opportunities to engage in
physical activity. Additionally, in Neely et al. (2015) and Nicholson et al. (2011) participants
were provided with one physical activity type (i.e., jumping on a trampoline and jogging,
respectively). In contrast, in the current study participants were allowed to choose one of the
three to five physical activity available. Nicholson et al. (2011) also gave participants a 5-min
“cool down” period (i.e., walking and stretching) between engagement in moderate-to-vigorous
physical activity and academic instruction; in contrast, in the current study academic instruction
immediately followed engagement in moderate-to-vigorous physical activity. Finally, as an index
of the intensity of physical activity Folino et al. (2014) measured participants’ heart rate
continuously throughout the duration of the physical activity, whereas the current study we
measured percentage of session engaged in physical activity.

Results of the current study also indicate that choice of physical activity did not increase
the efficacy of the intervention for any of the participants. That is, choice of physical activity did
not result in further decreases in disruptive behavior and increase in academic engagement.
These results are similar to those of Cannella-Malone et al. (2011) in which disruptive behaviors
occurred at similar levels during the choice and no-choice phases. In addition, in the current
study choice of activity was not correlated with higher engagement in physical activity in
comparison to no-choice for any of the participants. These findings are inconsistent with findings
of Wulf et al. (2014) where participants completed more exercises when given a choice of order
of exercises in comparison to participants that were prescribed a set sequence of exercises.
Similarly, Ledford et al. (2016) found that participation in physical activity (e.g., playing with
toys functionally) was higher in a structured choice condition (i.e., multiple activities available
plus prompts to choose one) compared to a condition without structure choice (i.e., multiple activities available but no prompts to choose one were presented). Furthermore, the findings of the current study differed from those of Prusak et al. (2004) where motivation to walk was higher for the participants in the group that could choose the walking activities compared to the no-choice group.

The current study extends the literature evaluating the impact of pre-class physical activity on disruptive behavior and academic engagement by evaluating its effect with a novel population, students identified as at-risk for EBD or classified as EBD without comorbidity. Previous research on non-contingent physical activity was conducted with students classified as EBD with the comorbidity of ASD or Intellectual Disability or only ASD (Cannella-Malone et al., 2011; Elliot et al., 1994; Kern et al., 1982; Neely et al., 2015). In addition, the current study is the only one assessing whether choice of physical activity enhanced the impact of exercise on disruptive and appropriate behaviors. Furthermore, the procedures employed here address some of the procedural limitations of the study completed by Cannella-Malone et al. (2011) in which data were not collected on student engagement in physical activity or the physical activity selected. Furthermore, because these researchers did not yoke the activities available during the choice and no-choice conditions, it is not be possible to determine if the differing results they obtained were due to the different activities completed, choice of activity, or a combination.

Although in the current study physical activity led to a decrease in disruptive behaviors for two out of three students, some limitations of the procedures employed in this study must be considered. First, participants were not required to continuously engage in physical activity, and we did not measure intensity (i.e., heart rate) of engagement of physical activity. Therefore, it is possible that the different outcomes across participants may be due to not completing the
activities with enough intensity. Second, procedural changes were made throughout the study. For instance, physical activities provided for Jacob (i.e., jumping jacks, jogging in place, and following an exercise video) were different than those provided for Jane and Mark (i.e., following a yoga, a dance video, and three different workout videos depicting various exercises). Two of the three activities provided for Jacob were repetitive movements (e.g., jumping jacks and jogging in place) and it didn’t seem likely that a child his age would be physically able to continuously engage in these activities for 5 min. Therefore, videos depicting various types of movements were selected for Jane and Mark. Third, to eliminate the potential confounding variable of different results across the choice and no-choice condition being impacted by the activity available and not the opportunity to choose the activity, yoking was employed for Jane and Mark. Thus, for Jacob it is unclear if choice, the type of physical activity available, or both, were responsible for greater overall decrease in disruptive behavior observed in the choice condition in comparison to no-choice. Data for all three participants indicated that choice had no effect on the percentage of engagement in physical activity or the effectiveness of pre-class physical activity on disruptive behaviors and academic engagement.

An additional limitation of this study is the procedure employed to select the activities available, which was designed to protect confidentially of the target student. All students with signed parent consent used a ballot to vote for one of the activities available and the ballots were placed inside of a bag. Then the PI pulled a ballot and announced the name of the activity to the class. This procedure was implemented in both the choice and no-choice conditions. Thus, it appeared to students that the activity prescribed was selected randomly from their votes. However, in the choice condition, the PI always selected the ballot completed by the target student. In the no-choice condition for Jacob, the activity available was selected randomly using
an online random number generator. In the no-choice condition for Mark and Jane, the activities were yoked to the previous session of the choice condition (i.e., the activity chosen by the student in the previous choice condition was the same activity announced to the class in the no-choice condition. Therefore, it is possible that it was unclear to the target student that on some days the activity available was in fact correlated with their vote. Future studies should consider alternative methods for selecting the activity (e.g., stating to the target student that their choice will be picked that day) and ways to ensure that the target student understands how their vote impacts the activities available. In addition, only four students in Jacob’s classroom had signed parent consent. This means that these students could easily discuss amongst themselves their votes and figure out that their vote alone was not responsible for the activity available.

In conclusion, this study evaluated whether pre-class physical activity was effective in decreasing disruptive classroom behaviors and increasing academic engagement with three students classified as EBD or at-risk for EBD. Results indicated that this intervention was an effective intervention and that choice of activity did not enhance the impact of this intervention. Results of this study indicate that pre-class physical activity is an effective, time and monetarily cost efficient, and simple intervention that can be used in the classroom setting.
REFERENCES

doi:10.1080/00220679909597608


doi:10.1177/1098300711406122

doi:10.1016/S0891-4222(96)00032-7

doi:10.1901/jaba.1996.29-519


Appendix A: Teacher Interview Form

1. In your classroom, are there 1-3 students who engage in disruptive behaviors during academic instruction on a daily basis (disruptive behavior may include, but is not limited to, talking without being permission, loud vocalizations, getting up from seat without permission, stereotypy, property destruction, crying, and tantrum)?
2. Do the disruptive behaviors generally require you to stop academic instruction to redirect the behaviors?
3. Do the disruptive behaviors generally distract other students from academic instruction?
4. In your opinion as an educator, do you feel the student’s engagement in disruptive behaviors interferes with his/her academic engagement and academic progress?
5. Are you willing and able to allocate 5-15 min class time for potential participants to engage in physical activity prior to academic instruction?
6. Are you comfortable with the primary researcher and research assistants observing potential participants in your classroom during academic instruction?
7. Please review the participant inclusion and exclusion criteria below and select up 3 students who you believe meet the criteria.

Inclusion criteria
a) disruptive behavior during at least 30% of academic instruction, b) willingness to participate in physical activity, and c) no medical issue that precludes participation in physical activity.

Exclusion criteria
a) Engaging in problem behavior that poses a risk of injury to himself/herself, the researchers, or the environment, b) frequent serve problem behavior when asked to do physical activity, (i.e., during Physical Education class), c) frequent school absences.

Student Nomination List

<table>
<thead>
<tr>
<th>Student 1</th>
<th>Student 2</th>
<th>Student 3</th>
</tr>
</thead>
</table>

8. Based on the Student Nomination List above, please circle all the disruptive behaviors the student typically engages in, and write in up to 3 other disruptive behaviors the student engages in if not listed.

<table>
<thead>
<tr>
<th>Student 1</th>
<th>Student 2</th>
<th>Student 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talking without permission</td>
<td>Talking without permission</td>
<td>Talking without permission</td>
</tr>
<tr>
<td>----------------------------</td>
<td>----------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>Touching other students</td>
<td>Touching other students</td>
<td>Touching other students</td>
</tr>
<tr>
<td>Throwing items</td>
<td>Throwing items</td>
<td>Throwing items</td>
</tr>
<tr>
<td>Out of seat without</td>
<td>Out of seat without</td>
<td>Out of seat without</td>
</tr>
<tr>
<td>permission</td>
<td>permission</td>
<td>permission</td>
</tr>
<tr>
<td>Loud vocalizations</td>
<td>Loud vocalizations</td>
<td>Loud vocalizations</td>
</tr>
<tr>
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<td>Stereotypy</td>
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</tr>
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<tr>
<td>Making loud noises with</td>
<td>Making loud noises with</td>
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<td>body and/or objects</td>
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<tr>
<td>(slamming books, banging on</td>
<td>(slamming books, banging on</td>
<td>(slamming books, banging on</td>
</tr>
<tr>
<td>desk etc.)</td>
<td>desk etc.)</td>
<td>desk etc.)</td>
</tr>
<tr>
<td>Other (1)</td>
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<tr>
<td>Other (3)</td>
<td>Other (3)</td>
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</table>
Appendix B: Recruitment Flyer

Pre-Class Physical Activity: Does Choice Expand its Effect on Disruptive Behavior?
PARTICIPANTS NEEDED FOR A CLASSROOM MANAGEMENT INTERVENTION RESEARCH STUDY!

Purpose:
The purpose of this study is investigating the effectiveness of students engaging in physical activity prior to academic instruction on reducing disruptive behaviors in the classroom. Also, to investigate whether or choice on the physical activity type plays a role in effectiveness.

Teacher Eligibility Criteria:
- Willing and able to allocate 5-15 min of class schedule to allow students to engage in physical activity prior to academic instruction
- Consent to allow this study to be conducted in your classroom
- Nominate at least 1 student based on participant inclusion criteria
- Allow researcher and research assistants to observe students during academic instruction

Student Eligibility Criteria:
- Ages 4-12 years old
- Engages in disruptive behavior for at least 30% of the time during academic instructional period
- No health/medical issues that effects the child’s ability and safety to engage in physical activity
- Likely to engage in physical activity

If you have any questions or are interested in participating and have students that may benefit from this intervention, please contact:
Olivia Mulligan, B.S., RBT
Master’s Student in Applied Behavior Analysis at the University of South Florida

Cell: (850) 628-2100
Email: Omulligan@mail.usf.edu
Appendix C: Data Sheet

10-s Interval Recording

Observer Name: __________________________ Date: _____________ Session # _______
Student Name: ___________________________ Teacher Name: __________________________
Circle 1: Baseline Intervention (Choice) Intervention (No Choice)
Codes: Occurrence (+) Nonoccurrence (—)
Bx 1: Disruptive Behavior, Partial interval  Bx 2: Academic Engagement, Whole Interval

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</table>

Total (+) _________  Total (—) _________  % of Bx __________
Appendix D: Physical Activity Engagement Data Sheet

10-s Momentary Time-Sampling

Observer Name: ______________________ Date: ____________ Session # ______
Student Name: _______________________ Teacher Name: ______________________
Circle 1: (Choice) (No Choice) Physical Activity ____________________________
Codes: Occurrence (+) Nonoccurrence (—)

<table>
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<tr>
<th>MIN</th>
<th>10s</th>
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</tbody>
</table>

Total (+) _________ Total (—) _________ % of Bx _____________
Appendix E: Social Validity Questionnaire for Teachers

(Adapted from IRP-15)

Please circle the number that best describes your agreement or disagreement with each statement using the scale below.

1= Disagree  2= Slightly Disagree  3= Neutral  4= Slightly Agree  5= Agree

1. This was an acceptable intervention given the target student’s disruptive behavior
   1  2  3  4  5

2. This intervention led to a decrease in the target student’s disruptive behavior
   1  2  3  4  5

3. Most teachers would find this intervention appropriate for disruptive behavior
   1  2  3  4  5

4. I would recommend this intervention to other teachers.
   1  2  3  4  5

5. I would be willing to use this intervention in the classroom setting with other students.
   1  2  3  4  5

6. This intervention would be appropriate for a variety of children and classrooms.
   1  2  3  4  5

7. This intervention was a fair way to handle the problem behavior in my classroom.
   1  2  3  4  5

8. I liked the procedures used in this intervention.
   1  2  3  4  5

9. This procedure is not too difficult or costly to implement
   1  2  3  4  5

10. Overall, this intervention was beneficial for the students in my classroom.
    1  2  3  4  5
Appendix F: Social Validity Questionnaire for Students

Please indicate Yes or No

1. I liked doing physical activity before class  Yes / No
2. I want to continue physical activity before class  Yes / No
3. I like the types of physical activities we did  Yes / No
4. I prefer choosing an activity  Yes / No
## Appendix G: Procedural Integrity Checklist

### Baseline Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>✓ = Completed</th>
<th>X = Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ensure students have not engaged in physical activity within 30 min of observation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 2. Remind teacher to instruct class per usual | ✓ | X | Score: \( \frac{2}{2} = \text{_______} \% \)

### Choice Condition Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>✓ = Completed</th>
<th>X = Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Present activity choices from predetermined list to students</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>2. Use vocal statement “pick one”</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>3. Allow students to indicate his/her selection</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>4. Allow students opportunity to engage in his/her selected activity for entire predetermined duration</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>5. Does not prompt engagement with physical activity</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>
| 6. Allows student to take a break from activity if students request | ✓ | X | Score: \( \frac{6}{6} = \text{_______} \% \)

### No-choice Condition Steps

<table>
<thead>
<tr>
<th>Step</th>
<th>✓ = Completed</th>
<th>X = Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Assign a number to each activity from the predetermined list</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>2. Select activity using a random number generator</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>3. Allow students opportunity to engage in the randomly selected activity for entire predetermined duration</td>
<td>✓</td>
<td>X</td>
</tr>
<tr>
<td>4. Does not prompt engagement with physical activity</td>
<td>✓</td>
<td>X</td>
</tr>
</tbody>
</table>
| 5. Allows student to take a break from activity if students request | ✓ | X | Score: \( \frac{5}{5} = \text{_______} \% \)
Appendix G: Procedural Integrity Checklist

<table>
<thead>
<tr>
<th>No-choice Condition Steps (Yoking)</th>
<th>✓ = Completed</th>
<th>X = Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Allow students to indicate his/her selection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Select the same activity from the previous condition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Allow students opportunity to engage in the activity for entire predetermined duration</td>
<td></td>
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</tr>
<tr>
<td>4. Does not prompt engagement with physical activity</td>
<td></td>
<td></td>
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<tr>
<td>5. Allows student to take a break from activity if students request</td>
<td></td>
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</tr>
<tr>
<td><strong>Score</strong></td>
<td>/5 = _________ %</td>
<td></td>
</tr>
</tbody>
</table>
Appendix H: IRB Approval Letter

10/7/2019

Olivia Mulligan
ABA-Applied Behavior Analysis
1005 Buena Vista Blvd.
Panama City, FL 32401

RE: Full Board Approval for Initial Review
IRB#: Pro00041441
Title: Pre-Class Physical Activity: Does Choice Expand its Effect on Disruptive Behavior?

Study Approval Period: 9/20/2019 to 9/20/2020

Dear Ms. Mulligan:

On 9/20/2019, the Institutional Review Board (IRB) reviewed and APPROVED the above application and all documents contained within, including those outlined below. Please note that this research is approved under the 2018 version of 45 CFR 46. The IRB determined that future reviews of this study qualify under expedited category 9 (Continuing review of research, not conducted under an investigational new drug application or investigational device exemption where categories two (2) through eight (8) do not apply but the IRB has determined and documented at a convened meeting that the research involves no greater than minimal risk and no additional risks have been identified) and you will be asked to confirm ongoing research annually in place of a full Continuing Review.

Approved Item(s):
Protocol Document(s):
IRB Protocol

Consent/Assent Document(s)*:
SB Adult Minimal Risk_12.7.18_RCR Final.docx.pdf
SB Parental Permission_Target Student 12.7.18_RCR Final.docx.pdf
SB Parental Permission Other students.docx.pdf
SB Assent Form with optional child signature line 11.9.18 Clean (1).docx**
*Please use only the official IRB stamped informed consent/assent document(s) found under the
"Attachments" tab. Please note, these consent/assent documents are valid until the consent
document is amended and approved. ** Please note, verbal and online consent documents will
not have the official IRB stamp.

Research Involving Children as Subjects: 45 CFR 46.404
This research involving children as participants was approved under 45 CFR 46.404: Research
not involving greater than minimal risk to children is presented.

Requirements for Assent and/or Permission by Parents or Guardians: 45 CFR 46.408
Permission of one parent is sufficient. Assent will be obtained as outlined in the IRB
application.

As the principal investigator of this study, it is your responsibility to conduct this study in
accordance with IRB policies and procedures and as approved by the IRB. Any changes to the
approved research must be submitted to the IRB via an Amendment for review and approval.
Additionally, all unanticipated problems must be reported to the USF IRB within five (5)
business days.

We appreciate your dedication to the ethical conduct of human subjects research at the
University of South Florida and your continued commitment to human research protections. If
you have any questions regarding this matter, please call 813-974-5638.

Sincerely,

[Signature]

Melissa Sloan, PhD, Vice Chairperson
USF Institutional Review Board
Appendix I: IRB Approval Letter

Pasco County Schools
Kurt S. Browning, Superintendent of Schools
7227 Land O' Lakes Boulevard • Land O' Lakes, Florida 34638

Accountability, Research, and Measurement
Peggy Jones, Ph.D., Director
(813) 794-2338 (727) 774-2338
(352) 524-2338 Fax: (813) 794-2116
E-mail: pejones@Pasco.k12.fl.us

August 7, 2019

Olivia Mulligan
Department of Child and Family Studies
C/O Aleatha Neal
13301 Bruce B Downs Blvd MHC 2113A
Tampa, FL 33612

Dear Ms. Mulligan:

Attached you will find an approval for your request to conduct your research study in Pasco County Schools entitled “Pre-Class Physical Activity: Does Choice Expand Its Effect on Disruptive Behavior?” As per district procedures, teacher participants are not to receive compensation individually but may receive compensation to a school account for the teacher’s classroom.

The purpose of your study is to assess the effects of pre-class physical activity on disruptive behaviors and academic engagement in the classroom and determine whether choice of physical activity increases the effects of this intervention.

Your Pasco County Schools' contact person is Anna Randazzo, Sr. Behavior Analyst, Office for Student Support Programs and Services.

We are always interested in the outcome of research conducted in our school system. When your study is complete, please forward a brief summary of your findings to the Office for Accountability, Research, and Measurement.

Best of luck as you pursue the subject of your research.

Sincerely,

Peggy Jones, Ph.D., Director
Office of Accountability, Research, and Measurement

/ig
Attachments

xc: Anna Randazzo, Sr. Behavior Analyst, Office for Student Support Programs and Services

(813) 794-2000 • (352) 524-2000 • (727) 774-2000 • www.pascoschools.org
List the major activities or phases of the study, approximate timelines for completing each phase and the expected completion date.

Procedure
Observations will be conducted during the same selected academic instruction period for each student. Each student will be exposed to three conditions, baseline, choice, and no-choice conditions. In the choice and no-choice conditions students will be given the opportunity to participate in physical activity prior to academic instruction period. Intervention will continue until disruptive behaviors decrease and academic engagement increases to acceptable levels as determined by baseline levels and teacher input. Sessions will be completed until there is differentiation across the treatment conditions or data suggest that both are equally effective. In addition, prompts to engage in the physical activity and reinforcement for participating in the physical activity will be used if needed.
Baseline time line: 1 week-1 month. During baseline, students will be directly observed during the predetermined academic instruction time for at least 30 min. The teacher will be instructed to conduct his/her academic instruction as he/she typically would outside of the study. Students will not participate in physical activity prior to these sessions.
Pre-Class Physical Activity. To assess the effect of physical activity on disruptive behavior and academic engagement students will be given the opportunity to participate in 5 to 15 min of an aerobic physical activity. Aerobic physical activity consist of any activity that results in increased heart rate (Elliott, Dobbin, Rose, & Soper).

List any special services or resources which are required for the completion of the study (e.g., videotaping, audio recording, etc.)

Potentially a screen and computer to project school-approved dance or work-out videos for the students to follow along.

For this study we are not asking Pasco to provide us with these items, however, if these are already available in the classroom they may be used for the study if we have permission.

Olivia Mulligan
Signature of Applicant

Note to Researchers: if you are approved by the District and you are seeking approval at the school level, a copy of your District approval letter MUST be shown to the school principal.

For Office Use Only

Approved - Yes: [ ] No: [ ]

Date: 8/7/20 [9]

Conditions, if any:

Signature of Director or Designee

Revised March 2019 – Pasco County Schools