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The Impact of the Inclusion of Movement and Exercise (Physical Learning) on Students in Educational Settings Receiving Special Education Services

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THE IMPACT OF THE INCLUSION OF MOVEMENT AND EXERCISE (PHYSICAL LEARNING) ON STUDENTS IN EDUCATIONAL SETTINGS RECEIVING SPECIAL EDUCATION SERVICES

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ABSTRACT

There continues to be an increase in child and adolescent obesity. Youth receiving special education services are particularly at risk of being more inactive than their peers. There are numerous benefits to engaging in physical activity, not only for health but also in support of academic needs such as concentration and memory and even stimulating brain neuron growth. Schools can be an ideal setting for supporting physical activity. This thesis focuses on the impact of physical movement on students receiving special education services, particularly highlighting students with Attention Deficit Hyperactivity Disorder, Autism Spectrum Disorder, and Emotional and Behavioral Disorders. The thesis will conclude with some social skills curriculum opportunities that incorporate physical movement.

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CHAPTER I: INTRODUCTION

Thesis Writer's Story and Purpose for this Thesis

As this thesis writer was growing up, he was always on the move, whether it was running around the house, biking with friends or the plethora of sports he participated in each season. Both then and now this writer connected with movement. It is part of the language that speaks to him, using the body and moving to reach a goal. Whether it is in the classroom or out on the soccer field, this writer saw children daily who loved to move and who did their best learning when they were moving. Spending nearly all of his life on the field as a player and coach, this writer has seen the growth and development of players as athletes and as people. People are attracted to the game for many reasons, but often, for kids, the opportunity to move their bodies while learning something with others is a big draw.

Throughout childhood, this writer was constantly seeking opportunities to move. Sitting in a firm chair at a desk all day was not just hard, it felt nearly painful. In the evenings, this writer could be found running around the neighborhood playing tag, riding bikes down the sidewalk, or playing a pick-up game of baseball or soccer in an open field. Recess and physical education (PE) classes were absolute favorites, and when this writer asked other children what part of the school day they enjoyed the most, without hesitation, they would say the same. Without a doubt, there is more freedom and a different type of rigor during those times of the day, but also kids get to move their bodies and engage physically in what they are learning at recess and PE.

This writer recently picked up his daughter from an outdoor day camp at a historic Minnesota single-room schoolhouse. This researcher asked about her experience, and as this writer listened to her share excitedly, it was noticed she went back and forth comparing the

schoolhouse of 1871 with her own school. She was intrigued by the similarities between the two classrooms; both had desks facing the front of the room, there was a large chalkboard for the teacher to instruct from like the whiteboard in her classroom, each student in the 1800s had a lapboard and a piece of chalk just like her individual whiteboard and dry erase marker. The biggest difference she remarked is that the classroom had students that were lots of different ages, there was a large stove for heat, the children had to use a rather smelly outhouse for the bathroom, and of course, there were no computers. The daughter's simplified comparison and description of the differences between school 150 years ago and today's classroom settings prompted this writer to reflect on the educational environments created for this researcher's students.

Over the past twenty years, this researcher has worked in education in a variety of roles, instructing and supporting students in their mainstream classes, teaching small groups, coaching students individually with social skills and behavior supports, and running a modified learning center focused on online credit recovery. Each student in those situations has had their own unique background and needs. This educator was called to the field of education because human interactions and developing strong relationships are at his core and a gift that this researcher wanted to bring to the world. Getting to know each student as a person is essential, this writer loves learning about their strengths and interests, what fills them, and gets them excited about life. As the relationship develops, sometimes the students then give glimpses into the parts of life that bring struggle. By celebrating their strengths and understanding their struggles, this educator can connect and help each student work through both academic and personal challenges.

IDEA

For the students, these challenges go beyond what many children experience in daily life. This writer has the privilege of working with amazing, exceptional children who have a disability. In 1975, the law known today as the Individuals with Disability Education Act (IDEA) was signed by President Ford. The passing of IDEA not only acknowledged the need for education but also required schools and other educational institutions to ensure the education of students with disabilities. There are 13 categories in which students can become qualified for special education services. Three of the categories that this researcher works most closely with include Other Health Disabilities, Autism Spectrum Disorder, and Emotional Behavioral Disorders.

Other Health Disabilities - Attention Deficit Hyperactivity Disorder

According to the Centers for Disease Control and Prevention (CDC), Attention Deficit Hyperactivity Disorder (ADHD) is one of the most frequently diagnosed psychiatric conditions for children in the United States. The National Survey of Children's Health reports that about 8% of children 3-17 years of age in Minnesota are identified with ADHD. There are three different types of ADHD: inattentive presentation, hyperactive-impulsive presentation, or a combined presentation. Children with the disorder often have challenges with inhibition, difficulty with self-control, impulsive behavior, trouble concentrating, and other executive functioning issues at school (Faraone et al., 2021). The diagnosis is made by a healthcare provider, often a pediatrician, after surveying several adults who work with the child in different settings using the DSM-5. The medical community is not certain of the origins of ADHD; however, links have been found to genetics.

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is neurologically based. As a mental and behavioral condition, the American Society of Psychology and health care providers use the criteria established in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) published in 2015 to make a diagnosis. These criteria include social communication and interaction deficits in multiple settings, restricted, repetitive patterns of behavior, interest, or activity, the onset of symptoms in early development, and that symptoms cannot be explained by other intellectual factors. With autism being a spectrum disorder, it can present in many different ways and in varying degrees of severity. In the school setting, students with autism may have challenges with developing or holding onto relationships, communicating with others, making transitions, and understanding expectations (Center for Disease Control, 2023). The most recent data from the Minnesota Autism and Developmental Disabilities Monitoring Network (MN-ADDM) estimates that in 2020, about 1 in 34 eight-year-olds have autism. Though the exact cause of ASD is unknown, potential factors are related to the environment, biology, and genetics.

Emotional Behavior Disorder

This category covers a variety of different types of emotional conditions, including anxiety, bipolar, conduct, eating, obsessive-compulsive, and psychotic disorders. Of this broad range of disturbances, anxiety and conduct disorders are most common in my classroom setting. There is a broad range of characteristics associated with emotional disturbances, such as hyperactivity, aggression or self-injurious behavior, withdrawal, immaturity, and learning difficulties. Environmental, biological, and genetic factors can contribute to these disorders. Frequently, conduct disorders co-occur with depression, ADHD, and learning disabilities (Mohan et al., 2023).

Purpose for Thesis

Research and experience prove over and over again that relationships are key to the growth and success of students, however, teacher efficacy, curriculum based on research, strong pedagogy, and other classroom practices have a high effect on student achievement (Hattie, 2008). For the writer, being in a district that values continuous improvement, in the Professional Learning Communities (PLCs) and at staff development, a lot of time is spent looking at standards and talking about research-based strategies grounded in Bloom's Taxonomy and Marzano's Art and Science in Teaching.

Recently, this researcher started looking at information and research from the University of Washington focused on the student experience, and that has prompted the writer to wonder, more than ever before, if schools can be doing something more or different to support the growth of students who receive special educational services. In 2015, Congress amended IDEA with the Every Student Succeeds Act, stating, "Improving educational results for children with disabilities is an essential element of our national policy of ensuring equality of opportunity, full participation, independent living, and economic self-sufficiency for individuals with disabilities" (Every Student Succeeds Act, 2015, Section 1400 (c) (1)). The urgent need to find new methods of working with students with disabilities is evident. Given the writer's experiences with activities that were physically oriented, as well as observations of children while engaged in physical movement, this researcher became curious about physical exercise and students' performance at school.

Physical Activity

In 1985, Casperson, Powell, and Christensen wrote an article for the Public Health Reports to define physical activity and physical exercise for medical research. This publication

has continued to be used through articles published in 2023 as the basis of understanding these terms. The definition of physical activity states, “Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure” (Casperson et al., 1985, p. 126). The energy needed to complete an activity can be measured in kilocalories and may have a low, moderate, or high intensity based on those measurements. Physical activity can be categorized related to types of activity or movement. These include occupational, conditioning, leisure, and sports, for example. The amount of energy and type of movement within these categories can impact the health benefits connected to that activity.

Physical Exercise and Physical Fitness Defined

Physical exercise is based on physical activity requiring skeletal muscle movement. The movements, however, must be planned, structured, and repetitive in nature. One of the goals of physical exercise is to support physical fitness. Physical fitness is the result of physical activity and physical exercise on one’s body. It can best be determined through a variety of different measured components, including cardiorespiratory, body composition, muscular strength, muscular endurance, and flexibility (Casperson et al. 1985). In this literature review and thesis, the focus will be any physical movement, sometimes being under the definition of physical activity and other times the more specific physical exercise and may support physical fitness in a variety of ways.

Thesis Question

With the desire to help students who may need different or additional learning support, this thesis asks the question: **How can movement and physical exercise impact students receiving special education services in education settings?**

CHAPTER II: LITERATURE REVIEW

Research Process

Challenged with the question, How can movement and physical activity impact students receiving special education services in educational settings? The writer began gathering information to learn more. Much of this research was done through the library and online search engines provided through the Bethel University Reference Library. There was a focus on peer-reviewed articles and books that were easily accessible through the Education Research Information Center (ERIC) and research-based government websites. In reviewing scholarly articles, the most current research was selected, understanding that many advancements in understanding the brain as well as disabilities have been made in recent years. Due to this development of newer information, a focus was put on seeking out multiple sources with similar results. Additionally, the initial or original study would be referenced for studies that were based on past research. “Physical activity,” “attention,” and “ADHD, EBD, and ASD” were valuable keywords in this research and review process. The Physical Activity Guidelines for Americans 2nd edition, created by Piercy et al. (2018) for the U.S. Department of Health and Human Services, Journal of Attention Disorders, and Journal of Behavioral Medicine were publications highlighting especially informative research related to this thesis.

Thesis Goal

The goal of this chapter is to provide a review of scholarly research that examines movement and physical exercise and how it can impact students receiving special education services. This review process will begin by highlighting research that examines physical activity and brain processing. It will address the mental and physical benefits of exercise and physical activity. Then, it will explain the current reality of physical activity for children including within

the school environment. Next, it will look at the impact of physical movement on positive behavior and participation in academics, particularly looking at the impact on students with ADHD, EBD, and ASD. Finally, there will be an exploration of effective strategies that incorporate movement.

Types of Activity

Aerobic activity is often referred to as cardio or endurance exercise. It relies on large muscle movements for an extended amount of time. Examples include running, biking, jumping rope, swimming, and walking at a quick pace. Muscle-strengthening exercise has resistance training or weight lifting, where muscles need to hold or use force or weight. For adolescents, that may include lifting weights, and at the elementary level, it may be focused on activities that use body weight, such as climbing. Bone-strengthening exercises are focused on weight-bearing activities where a force is placed upon the bones during movement. This may include jumping jacks, running, or weight lifting. In order for students to reap the benefits of physical activity, engaging in all three types of activities to a degree is most impactful, with the suggestion of engaging in each type three days a week (Piercy, K.L. et al., 2018).

Physical Activity Physiology

Physiologically, physical activity supports the body's circulation through increased blood flow, including to the brain. Physical movement and exercise also increase the level of endorphins, neurotransmitters associated with positive feelings. Both the physical movement and production of endorphins can help reduce some of the effects of stress, such as releasing tension by mimicking the natural body response of fight or flight (Mayo, 2022). Post-exercise, there may be an improved mood and calmed body, better preparing a student for learning (Taras, 2005).

Benefits of Physical Activity

For children, there are a variety of both mental and physical health benefits as a result of physical activity. Some of the immediate effects of exercise include decreasing short-term anxiety feelings and improving sleep and cognitive functioning. Following routine moderate to vigorous exercise, brain benefits show enhancement of attention, memory, thinking, and processing speed, as well as other cognitive processes such as those measured on academic assessments. There are also improvements in executive functioning skills such as planning, organizing, the ability to monitor or inhibit behaviors, task initiation, and emotion control. Mental health advantages include a reduced risk of depression and anxiety and deeper sleep. A potential additional benefit to note is that in studies with rodents, empirical data shows that exercise encourages the growth of new neurons. Scientists believe this may have human implications (Liu & Nusslock, 2018).

Physical benefits highlight strong muscles and endurance in muscular fitness, bone strength, support of cardiometabolic health in maintaining normal blood sugar levels, improving aerobic fitness and blood pressure for heart and lung health, reducing the possibility of chronic diseases such as type 2 diabetes and obesity and supporting healthy body weight and reducing body fat. It is important to note that when considering the impact and benefits of physical activities, researchers have found that the amount of time someone is engaged in an activity is more important than the intensity, frequency, or duration (Piercy et al., 2018).

Youth Physical Fitness

Despite modern technology and medical advancements, the Center for Disease Control and Prevention's (CDC) latest life expectancy data is the lowest in almost two decades. The life expectancy at birth is now 73.5 years for males and 79.3 years for females. Though COVID-19

has impacted that statistic, heart disease still remains the leading cause of death along with other diseases such as diabetes (Xu et al., 2021).

These diseases are related to physical fitness and poor nutrition. The CDC report by Xu et al. (2021) states that in the United States, childhood obesity is a serious condition. In the most recent research of youth ages 2-19 years in 2017-2020, obesity was found at a rate of 19.7%, which is about 14.7 million children and adolescents as measured by the body mass index. In surveys, they also found that only 20% of youth meet the guidelines and recommendations for daily physical activity (Centers for Disease Control and Prevention, 2019). When digging a little deeper into the population of inactive youth, students with ASD and ADHD are more likely to be inactive (Pontifex et al., 2013). In similar findings, students with ADHD and conduct disorders are at a greater risk of obesity (Khalife et al., 2014). Additionally, Mangerud et al. (2014) reported that students with mental health problems were engaged in less physical activity, such as participation in individual and team sports. They found that youth with mood disorders followed by ASD were most inactive.

The American Heart Association (AHA) stated, “Active kids have a better chance of a healthy adulthood” (AHA, 2018). Engaging in physical activity along with healthy eating habits can help reduce the risk of heart disease and other health problems in the future. The AHA recommends that children ages 3-5 be involved in active play and structured movement for about three hours a day that reflects light, moderate, and vigorous activities. For youth ages 6-17, 60 minutes of moderate to vigorous activities are encouraged. These 60 minutes can be segmented throughout the day into shorter blocks. Additional suggestions include being active throughout the day and finding ways to replace inactive and stationary activities with those that include movement.

Physical Exercise at School

Schools are an important environment for supporting the physical movement of kids, especially considering the amount of time that students are at school and the potential to provide equitable access to physical activity opportunities. Though lifestyle habits are a main factor in both physical and mental health, schools may also be partly to blame for the inactivity of youth. Information collected by the U.S. National Health and Nutrition Examination Survey, as reported in The Physical Activity Guidelines for Americans by Piercy et al. (2018), found that children and adolescents are sedentary or sitting for about 7.7 hours of their day, meaning 55% of their wake time. In Minnesota, during the 2022 legislative session, a statute was written directing schools to not withhold recess from students in kindergarten through fifth grade for punishment or disciplinary reasons. No law states requirements on the time of scheduled recess, however. The Minnesota Department of Education states that best practice includes at least 20 minutes for elementary students. From the state, there are no recess options or guidelines given for middle or high school students, and there is no federal law for recess at any level.

In terms of physical education (PE), Minnesota requires students in kindergarten through eighth grade to receive instruction yearly. High school students should participate in physical education classes at least one time, with the credit and graduation expectations being determined by the school district. There are no specifications on the amount of time or frequency of PE instruction. Nationally, at the high school level, about 26% of students have PE class five days a week, and 52% have movement opportunities through PE once a week (Centers for Disease Control and Prevention, 2019). When looking at laws with a physical activity requirement, only 21 states have an elementary school expectation, 13 states have a middle school amount, and nine states provide a high school specification (Classification of Laws Associated with School

Students, 2020). This is particularly alarming when the Healthy People 2030 national objectives are focused on an increase in daily physical education.

Movement and Overall Academic Success

In 2010, the Centers for Disease Control and Prevention (CDC, 2010) completed a meta-analysis of nine different studies that investigated physical activity in the classroom on academics. They found that in eight out of the nine reports, there was improvement in cognitive skills, academic behavior, and academic performance. Additionally, these studies showed that there were no adverse effects on students' learning by committing time out of academics to physical activity.

Physical Exercise and Positive Behaviors

Engaging in on-task behaviors such as looking at the teacher, listening to adults, keeping hands and body to oneself, and participating in activities is essential for academic and behavioral growth. In a study looking at using physical activity to increase on-task behavior, Vail and Ayres (2014) found value in using movement as a proactive intervention for students receiving special education services rather than a reactive approach. This has been seen in a variety of settings. In a study by Mahar et al. (2006), in third and fourth-grade classrooms, students engaged in ten minutes of physical movement. They had been observed for on-task behavior 30 minutes before the activity and 30 minutes after, and they found a 20% increase in on-task behavior during instruction following the exercise.

Harvey et al. (2017) also looked at the effects of physical activity on learning behaviors in the elementary school setting. Participants in this study either demonstrated difficulties in learning behaviors such as actively listening, following directions, showing self-control, cooperation, respecting others, and using materials purposely or had Individual Education Plans

(IEPs) that included behavioral goals. Participants in the study engaged in moderate to vigorous physical activity throughout the week, totaling about 100 minutes. The activity would happen during academic classwork, such as marching during a language arts lesson or standing up and then sitting down quickly during science. Results of the study showed that the student group receiving the physically active lessons showed significant improvements over time in the overall behavior engagement rating scores, while the behavior engagement rating scores of the control group showed no change or a slight decrease over time.

Physical Activities and ADHD

Many of the previous studies exemplified the positive impact of physical activity on the general population and highlighted success in the school setting. The next sections examine the impact of physical movement on students who qualify for special education services. As defined in Chapter 1, Attention Deficit Hyperactivity Disorder (ADHD) is characterized as having an inability to show self-control, regulate impulses, and maintain focus. Children with ADHD displaying hyperactivity may show constant fidgeting and movement. This persistent need for movement may be because of under stimulation in brain function; therefore, students naturally seek out activities or behaviors that will provide that stimulation (Kercood, 2007). Impulsivity is another facet of ADHD, showing frequent blurting or immediate reaction to thoughts or interactions. An additional symptom is distractibility, which makes it hard for students to streamline information into relevant and irrelevant categories in order to build and understand concepts (Carbone, 2001). Many of these behaviors can make it challenging to be successful in the traditional classroom setting.

Smith et al. (2013), in their research, piloted a program intended to evaluate whether physical activity can reduce the severity of ADHD symptoms. This study included children in

grades kindergarten through third who displayed four or more hyperactivity/impulsivity characteristics on the Disruptive Behavior Disorders Rating Scale. Across eight weeks, students engaged daily in about 26 minutes of moderate-to-vigorous physical activity. The setup of the before-school program was the rotation of small groups of about five students across stations that lasted about six minutes. Stations were a combination of games and movement activities such as jumping and skipping. The Smith research team looked at a variety of different measures in evaluating the effect of physical activity on the behaviors of students with ADHD. They found the greatest improvement in response inhibition but found an overall improvement of 64%-71% in cognitive, motor, social, and behavioral functioning as reported by parent, teacher, and program staff ratings.

As examined above, there are immediate effects of exercise on students with ADHD, but because ADHD is a neurodevelopmental disorder that persists into adulthood, examining the more long-term or permanent impact of ADHD is relevant as well. Halperin and Healey (2011) looked at whether the developmental trajectory of ADHD can be changed. Their investigation focused on the brain because children with ADHD have been found to have less brain volume in the frontal region connected with executive functioning as well as in the cerebellum and other cortical regions as compared to that of their peers. Functional magnetic resonance imaging (fMRI) has shown low activation of the cerebrum, thalamus, and cerebellum in people with ADHD (Ivanov et al., 2010). When engaged in physical activity, neural growth has been exhibited, in addition to an increase in processing capabilities in those areas. Over time, this may have a cumulative effect supporting long-term engagement in aerobic physical activity as a treatment or intervention for ADHD (Christiansen et al., 2019).

In studying ADHD, researchers have established that there is a strong need to implement alternative learning strategies in the classroom. In servicing students with ADHD, it is important to use instructional methods that are effective for these learners before they fall behind or fail. This indicates that the strategies should be embedded into practice, not just used as an intervention.

Beyond engagement in the classroom, physical activity and the mental health of students with ADHD is also an important factor. Youth with ADHD might show a greater risk for exhibiting feelings of anxiety and depression, which affects all aspects of their lives. According to information provided by the CDC, students with ADHD may be more likely to express feelings of sadness and hopelessness when they are unable to control their ADHD symptoms, therefore disrupting their ability to perform well in school or engage successfully with others. A 2009 study by Kiluk, Weden, and Culotta examined the connection between social and emotional functioning and physical activity in children ages six to fourteen with ADHD. Their investigation found that with greater participation in sports, there was a correlation with fewer anxiety and depression symptoms. This study also found that for children with ADHD who participated in three or more sports were significantly lower in these mood symptoms as compared to those students who engaged in less than three sports. (Kiluk et al., 2009)

Autism and Engagement in Movement

As was previously defined, Autism Spectrum Disorder (ASD) is a neurological condition that has a broad range of characteristics, including difficulty with social skills, repetitive behaviors, and challenges with speech and communication. Research has found that adolescents with Autism Spectrum Disorder (ASD) are at a greater risk for obesity (Healy et al. 2019). This may be a result of the lower levels of moderate to vigorous that they are engaged in as compared

to their peers. There has been an increase in the inclusion of students with ASD in mainstream school settings; however, there are some barriers youth with ASD may experience when trying to engage in physical activity, including posture, coordination, motor planning, and motivation.

Despite some of these challenges, studies are finding academic benefits when students with ASD are engaged in physical activity. A study by Nakutin and Gutierrez (2019) looked at how physical movement could increase behaviors such as academic engagement and expected responses in children with ASD and decrease aggression and self-stimulating/stereotypic or off-task behaviors. In their study, elementary students with ASD engaged in about 12 minutes of jogging with a five-minute cool-down time of walking and stretching. During this exercise time, an adult may jog with the student, and verbal praise or the option of selecting a small item, such as a pencil or ball, was used as positive reinforcement. A sticker on a card was used to mark completed laps during the physical activity time period. Students then participated in academic learning within their classrooms. While in the classroom, students were observed and evaluated using the Behavioral Observation of Students in Schools (BOSS) as developed by Shapior (2011). The scores obtained at that time were compared to a baseline that was gathered for a two-week period prior to beginning the exercise intervention. Results of this investigation found a large effect size for academic engagement, showing a great increase in on-task behaviors and participation.

In addition to evaluating physical activity in youth with ASD and academic engagement, another area of study looks at the connection between physical activity and the development of social skills in students with ASD. A study by Lee et al. (2020) investigated the learning of social skills through a movement-based program. Their research focused on children with an average age of 9.3 who were enrolled in an eight-week program twice a week after school.

Movement activities were selected that would require interactions with others related to the social skills being practiced. Lee's research team found that a majority of participants improved in the measured social skills and that further work in the merging of social skills and physical activity would be advantageous. An additional benefit of this investigation was an improvement in object-control skills for children with ASD.

Considering the variety of different studies regarding physical activity and students with ASD, Park et al. (2021) did a meta-analysis look at the effectiveness of the intervention for individuals with autism. In their evaluation of 14 studies, they found that physical activity interventions had a moderate-to-large positive effect on problematic behaviors. They also found that sports-related activities had a higher impact than exercise-related movements. Interventions supported by professional practitioners were more effective than those by teachers, indicating that perhaps for those teacher-led programs, more training may be needed. Overall, their findings were conclusive that physical activity is supportive for youth with autism and that continued investigations would be beneficial.

Emotional and Behavioral Disorders and Physical Activity

As discussed in Chapter I, symptoms of Emotional and Behavioral Disorders (EBD) include refusing to follow directions or defiance, becoming physical, and having difficulty when facing frustration. Many of these behaviors are similar or comorbid with ADHD; therefore, many of the benefits of physical activity and EBD have already been highlighted in that section. A study by Cannella-Malone et al. (2011) investigated how exercise could be used as an antecedent with challenging behaviors in students with a developmental disability and emotional disorder. Children in the research study participated in eight daily exercise sessions of 1 to 20 minutes spread across the school day. Examples of exercises included trampoline jumps, curls with

weights, wall pushes, scooter boards, slow jogging or fast walking, crab walking, and lunges. The daily exercise schedule started with twenty minutes before school and then a 1 to 5-minute exercise break each hour of the school day, with another 20-minute session mid-day. Canella-Malone et al. (2011) found an almost immediate impact on behaviors as soon as the program began. They found that challenging behaviors, including hitting, kicking, yelling, spitting, and throwing, dropped from an average of seven a day down to one.

Many studies have used exercise separate from academics as an intervention to support students receiving special education services, but there is also the approach of merging exercise and teaching skills. Children with EBD often do not have the same prosocial behaviors as their typical peers, so an important area of research looks at how physical activity can impact those behaviors specifically. Aljadeff-Abergel et al. (2012) investigated how social skills can be learned in a play setting using physical activity. They focused on a way of implementing a program called Educating Through the Physical (ETP) (Edlar, 2008; Eldar & Ayvazo, 2009). This program looks at physically active play as a means to support and encourage learning social skills.

Eldar identified eight characteristics of a successful setting for the program to support this type of learning. These include a setting that is easily adjustable, distinct and repetitive activities, rules and consequences, visible performance measurable outcomes, frustrating situations, and competition. The model that Aljadeff-Abergel et al. (2012) created was based on those setting requirements and intended for use by special education teachers and physical educators with students with EBD in their classes. The hope was “to provide their students with authentic social skills training in a natural setting” (p. 77).

The first step of the program was a functional assessment, which identifies an undesired behavior and the situation or natural setting where it occurs. This assessment identifies one of 12 behavioral goals. Those goals include cooperation with the teacher, attention and concentration, responding to rules and routines, waiting, independent performance, dealing with demands, perseverance, termination of a favored activity, cooperation with others, self-control, self-management, and peer teaching. Next, multiple scripts are developed that are about five minutes each to equate to about a 30-45-minute lesson. These scripts are specific to the behavioral goal from the functional assessment. Lessons or scripts are taught individually or in small groups at least twice a week and include both teacher and student modeling. The third phase is practice for mastery. In the Aljadeff-Abergel et al. (2012) application, they embedded all of this learning through physical games and activities such as soccer, catch my scarf, a treasure hunt, shuttle runs, and relays.

The fourth component of the program then evaluated how students could generalize their goals to other settings. This generalization could be more successful when the teacher uses support cues as needed to identify appropriate or inappropriate behaviors. Further support and follow-up is the final component of the model, focused on both acknowledging growth and progress, especially in other skills that were not taught, reteaching as needed and reinforcing learned skills. Edlar et al. (2008) used the EPT model in a physical education class where students receiving special education services displayed extremely disruptive behaviors. Upon its completion, inappropriate behaviors had decreased, and there was an increase in learning time and a change to the overall climate of the classroom. Additionally, teachers reported that there was a transfer of skills to other areas in the students who were engaging in the targeted

behaviors. It is also important to note that a survey was given regarding satisfaction, and students participating found the program favorable.

Physical Activity and Academic Motivation

Though the physiological impact of exercise on the brain is proven and important with concentration, staying on task, impulse inhibition, and other learning behaviors that lead to academic achievement, motivation, and engagement are also key to success. Intrinsic motivation is completing something due to its interest or enjoyability and is frequently measured using the Intrinsic Motivation Inventory as developed by McAuley et al. (1989). With intrinsic motivation proven in positive association with achievement, Vazou et al. (2012) explored if physical activity in the classroom could promote that motivation. Ten minutes of physical activity were woven into a 45-minute lesson. They were of moderate intensity, and students were able to choose between a variety of fundamental motor skills, such as skipping or galloping, while engaging in academic practice, such as flashcards. Overall, students reported lessons with the incorporation of physical activity more interesting and enjoyable and put in more effort compared to learning without movement. Results showed a significant positive correlation with movement and enjoyment, perceived competence, effort, value, and interest. It is also important to note that the results were similar across different subject areas, indicating that this strategy can potentially be effective regardless of the content area.

Strategies for Integrating Physical Activity and Academics

As this chapter has described, physical activity can positively impact youth in a variety of ways. Within the school setting physical movement can either come from academic activities that embed movement or from an exercise opportunity prior to engagement in learning tasks. This final section will review and highlight some research-proven strategies that incorporate

movement directly into academic instruction. Donnelly et al. (2009) implemented activities from Physical Activity Across the Curriculum (PAAC) in 24 elementary schools for three years. In this study, students were engaged in 90 minutes of moderate to vigorous physical activity. This was done in 10-minute segments throughout the week. This time was in addition to the 60 minutes of PE that students already were engaged in, making a total of 150 minutes of physical activity per week.

The activities of PAAC are based on a curriculum called Take10! that was developed by the International Life and Sciences Institute (ILSI) Research Foundation. Health experts and teachers worked together to develop instructional methods that integrate 10 minutes of physical activity into academic learning. Activity cards tied to academic standards are included in the curriculum resources and may look like jump roping while practicing multiplication tables or doing two-part musical movements while reviewing how to make words into contractions. Donnelly et al. (2009) found, which has been mimicked in many other studies, a significant improvement in reading, math, and spelling as compared to the control group. These results indicated that the instructional strategy of integrating a short period of 10 minutes of physical activity into the classroom was enough to support gains in academic achievement gains.

Another strategy of movement integration that was examined by Mahar et al. (2006) was "Energizers." This approach inserted 10-20 minutes of physical activity during the elementary school day. This activity, which they called "Energizers," included a variety of movements that could be performed in the classroom without equipment. These activities were led by the teacher, who followed a specific script and prescribed speed or intensity for completing the activities. It was found effective in on-task behavior, as previously discussed, and has been proven in additional studies of the "Energizer" program by Bailey and DiPerna (2015).

Research is beginning on new online options that have similar characteristics to both Take10! and the Energizers from Mahar et al. (2006). One such program is called GoNoodle where students are led in a variety of physical activities of moderate intensity. Some activities include running in place, jumping while following a track hurdler on a screen, mirroring a dance being shown, or even dribbling and shooting a pretend basketball. Peer review research of this program is just beginning to be explored. Wold et al. (2023) is one example that found fluency reading scores to significantly increase after engaging in the GoNoodle physical activity breaks.

The research compiled in this literature review highlights the benefits of physical activity on all students, emphasizing its impact on mental health, physical health, and academic performance, including concentration, engagement, and even motivation. Studies have shown that these benefits extend beyond the general population and can have a high impact on students with ADHD, ASD, and EBD receiving special education services as well. The shared research exemplifies some of the ways that physical activity can be used as an intervention and also opens the opportunity for the development of curriculum and instructional frameworks that can use the benefits of physical activity to support student learning.

CHAPTER III: APPLICATION OF THE RESEARCH

In Summary

The literature review in Chapter II highlighted that interactivity, movement and physical activity do benefit students both academically and behaviorally. Some of those benefits included an increase in attention, impulse inhibition, and improvements in on-task behavior. Additionally, the review showed a variety of different strategies that can be incorporated into the educational setting to support and encourage the positive impact of physical movement. This thesis has presented these specific benefits, and as educators, it is then important to focus on applying the research in the context of instruction for our students receiving special education services.

As I began to investigate possible curriculums that support academic and behavior growth with physical movement, I discovered that there were curriculums that may have some lessons that included some of the strategies, but that there are not curriculums written based on applying interactivity with the academic or social skill. Reflecting on my experiences in education, I started brainstorming potential curriculum resources. One possibility might be a curriculum that merges academic learning with skills being practiced in PE or adaptive physical education; this could even highlight physical or motor goals found in IEPs. Or perhaps in mathematics, a curriculum could incorporate movement within real-world math applications.

As I continued to think about potential applications of movement in academics and behavior learning, a specific need of the students I worked with came to mind. One of the greatest areas of lagging skills is social-emotional learning. From that, I started thinking about the application of the research presented in my literature review within the context of teaching social skills. The following is a proposal of a theoretical curriculum development that would apply movement to learning social/emotional/behavioral skills.

Social Skills through Sports Curriculum

The Development of Social-Emotional and Behavioral Skills through Physical Movement

Social Emotional Standards

This curriculum focuses on social skills. The Collaborative for Academic, Social, and Emotional Learning (CASEL) has identified five different competency areas through its research. The state of Minnesota has adopted CASEL's framework as a guide to help school districts create focuses for social-emotional learning for their students (CASEL, 2023). The competencies outlined include relationship skills, self-awareness, self-management, social awareness, and responsible decision-making. These competencies would be the basis for units developed in the proposed curriculum. Each competency area has a variety of sub-competencies that would be the focus of skills for each weekly unit.

Social Skills through Sports Week Unit Exemplar

OVERVIEW

Competency - Relationship Skills Learning Goals: 1. Demonstrates a range of communication and social skills to interact effectively. 2. Cultivates constructive relationships with others. 3. Identifies and demonstrates approaches to addressing interpersonal conflict.
5 Days - Day 1: Active Listening - Day 2: Encouraging Others - Day 3: Offering Feedback - Day 4: Being Assertive - Day 5: Showing Sportsmanship
Goals/Learning Targets

I can engage in active listening.
I can encourage others.
I can offer feedback respectfully.
I can be assertive and ask for help.
I can show respectful sportsmanship.

Assessments:
Formative Assessments
-Observation and Student questioning.
-Exit Slips
Evidence: Students can articulate the skill and how they will use it.
Summative Assessments
- Daily Behavior Scale
- Behavioral evaluation used in IEPs

DAY 1

ACTIVE LISTENING

I can engage in active listening.

Accessing Prior Knowledge/Hook
Simon Says Game
Directions
Choose one person to be "Simon."
The person it says,"Simon says…" telling the kids to perform a physical action. For example, "Simon says jump up and down," "Simon says run in place." Each student must perform the action. If Simon leaves out "Simon says" before giving instruction, anyone who performed the activity is out.
Engagement Question

- What helped you to be successful in this activity? Draw discussion to active listening.

New Information/Learning Activities
Connection

- What do you listen to?
- What do you do while you are listening?

The Why

- Reasons for listening.

- Brainstorm a list of what and why we listen (Ideas: siren to warn, music to motivate while working out, podcast to be entertained, coach to learn/know a play, teacher new information…)

Strategy

- When listening to learn or to follow directions, active listening is important.
- Strategy for active listening - BEST listening

B - Body posture (so brain is alert)
E - Eye contact (give speaker eye focus)
S - Silent (keep voice off, avoid speaking with others)
T - To yourself (keep your body calm and to yourself, avoid engaging with others until directed to do so)

Apply Knowledge

Beans on Toast Game

Directions

- The person calls out different types of beans. Each bean type has an action. The object of the game is to follow the direction quickly and accurately. If you are able to go the longest without making a mistake, you get to be the new leader.

Bean Types

- String Bean – Stand straight and tall with your hands together over your head
- Chilly Bean – Shiver like you're out in the cold
- Dancing Bean – Show one of your best dance moves
- Green Bean – Run in place as fast as you can
- Red Bean – Stop running and freeze
- Jelly Bean - Wiggle around
- Jumping Bean - Jump in place

Variation: The person can call out "Beans on Toast" and everyone drops to the ground as quickly as possible.

Summary

Review active listening strategy BEST and how to apply it in the classroom.

DAY 2

ENCOURAGING OTHERS

I can encourage others.

Accessing Prior Knowledge/Hook (5 minutes)

Play Rock Paper Scissors Tournament Style

Directions

Find a partner

Play Rock, Paper Scissors against each other

- Say, "Rock, paper, scissors go."
- Display symbol with hands
    - Rock: fist
    - Paper: straight hand
    - Scissors: Index and middle-finger pointing out
- Determine who wins
    - Rock breaks scissors
    - Scissors cuts paper
    - Paper wraps rock
- The winner has to find a new opponent and the loser adds to the cheer squad of the winner.
- Repeat until there are only two opponents with a huge fan base.

Engagement Question:

- What happened at the end of the game? Talk about the cheering.

New Information/Learning Activities

Connection

- When do you see people encourage others?
- When do you encourage others or people encourage you?

The Why

- When should you give encouragement?
- When should you give someone space?

Strategy

How to encourage others:

- Say positive words using an enthusiastic and sincere voice
- Show empathy by noticing how the person is looking and feeling

- Offer support or help if needed

Apply Knowledge

Free Throw Challenge

Directions

- Divide students into groups of 3.
- Each member of the group will take turns shooting free throws with a basketball.
- The other team members will be providing encouragement.
- A player will continue to shoot until a basket has been made and then it will rotate to the next player's turn.

Summary

What is a situation that you may have in the future where you would encourage someone? What would you say or do?

DAY 3

OFFERING FEEDBACK

I can offer feedback to others respectfully.

Accessing Prior Knowledge/Hook

Backwards Bucket Ball

Directions

- A selected student stands at the free throw line, across from a bucket that is under the basket.
- The student faces away from the bucket and tries to throw a ball over their head into the bucket.
- Have the student try several times without receiving any feedback.
- Students share ideas to the selected student on how to make it into the bucket.

Engagement Question

- What happened once we were able to give advice on how to get the ball in the bucket.

New Information/Learning Activities

Connection

- When have you received feedback?
- How has the feedback made you feel?

The Why

- The purpose for feedback.

- When and why is feedback supportive?

Strategy
How to Give Feedback
- Begin with sharing something positive
- Share something that could be improved and why
- Offer an idea for what the person could do differently
- Use a respectful tone and word choices

Apply Knowledge
Bag Toss/Cornhole
Directions
- Divide students up into groups of two.
- Each team member stands at the opposite board from one another.
- Team members face each other.
- 8 bags start at one side.
- Players alternate throws until no bags are left.
- Players should be given each other feedback such as tips and suggestions for making it into the hole.

Summary
What are some positive outcomes that can occur from giving feedback?

DAY 4

BEING ASSERTIVE

I can be assertive and ask for help.

Accessing Prior Knowledge/Hook
Clean Your Yard!
Directions
- Split the space into two halves and participants into two even groups.
- Dump a large bag of balls in the middle of the space.
- Players on both sides throw or roll the "trash" out of their space and into the opponent's space.
- Play for three to five minutes. Then count how many pieces are in each yard.

Engagement Question
- What did you need to do to be effective in the game? To be effective could you wait for a ball to get to you or for someone else to get it?

New Information/Learning Activities

Connection

What situations might you need to be assertive?

The Why

Discuss assertiveness vs. aggression

Strategy

Being Assertive

- Identify your thought, opinion or the action that you need to take.
- Identify who you need to connect with to move forward or what you need to
- Using a calm voice explain your thinking.

Apply Knowledge

Capture the flag

Directions

- Divide students into two teams.
- Place a flag within each team's boundaries.
- Each team tries to take the other team's flag and return across the center line without being tagged.
- When guarding the flag zone and defender must be at least two feet away from the zone boundaries.
- If a player is tagged with on their opponent's side, they must go to the holding zone.
- A player can be freed from the holding zone when a teammate crosses the center line and tags the player. The player and their freer get to walk back to their side without getting tagged.
- A player can only free one teammate at a time.

Summary

Four Corners Discussion

Directions

- Label each corner with a discussion question.
    - What does it mean to be assertive?
    - Give an example of being assertive or a situation where you may need to be assertive.
    - What is the difference between aggressive and assertive?
    - What is a situation that it is difficult for you to be assertive in?
- Countdown from 10 to 0. Students walk or run to a corner.

- Next students discuss the question in their selected corner.
- Share out answers with the whole group.

DAY 5

SHOWING SPORTSMANSHIP

I can show respectful sportsmanship.

Accessing Prior Knowledge/Hook

Musical Chairs

Directions

- Set up one less chair than the number of players.
- Play music and have players walk around the perimeter of the chair circle.
- When the music stops, everyone must immediately sit in a chair.
- One person will be left standing.
- Remove another chair and continue until only one person is left.

Engagement Question

- How did it feel to get out?

New Information/Learning Activities

Connection

- What situation may you need to show sportsmanship? (Include non athletic events as well - eg. board games)

The Why

- Fair play in sports and games.
- Showing respect for the game, the coaches, the referees, opponents and teammates.

Strategy

Brainstorm what is important for showing sportsmanship.

- Take turns and follow the rules of the game.
- Keep all comments positive.
- Thank all people who participate. Remember to not brag if you win and congratulate the people who won.

Apply Knowledge

Gaga Ball

Directions

- All players start with one hand touching a wall of the pit

- The game starts with a ball being thrown into the middle of the pit.
- Once the ball starts any player can hit the ball with their hands.
- If a ball touches a player below the knee they have to leave the pit.
- If the ball is caught the player who hit the ball is out.
- No player can hold the ball.
- Play until all players but one have been eliminated.

Summary
Pretend you were teaching someone younger how to show respectful sportsmanship. What would you say?

Implementation

Demographic Context

In proposing this curriculum, I am specifically keeping in mind students I work with who have specific goals written into their IEPs related to social skills. Typically, students with these needs would be receiving tier two or three interventions in the area of social and emotional learning. However, many teachers, administrators and parents have observed and expressed the need for many children who do not receive special education services to further develop their social skills as a result of the pandemic. With that in mind, elements of this curriculum could also be used in a larger group context for what might be more deemed as a tier-one support in the response-to-intervention model. This curriculum is developed with students grades 6-8 in mind but could likely be adapted quickly to be accessible to younger age groups or extended for older students.

Setting

This curriculum could be used in a variety of settings, for example, in a Strat Skills class where students receive support for emotional and social skills and executive functioning skills. It also could be used as a resource for students who are pulled into a small group during physical

education class. Additionally, it could be used by special education teachers when they pull students to receive service minutes. Summer school programs or extra targeted services classes before or after school are also settings that could utilize the Social Skills through Sports curriculum.

Schedule

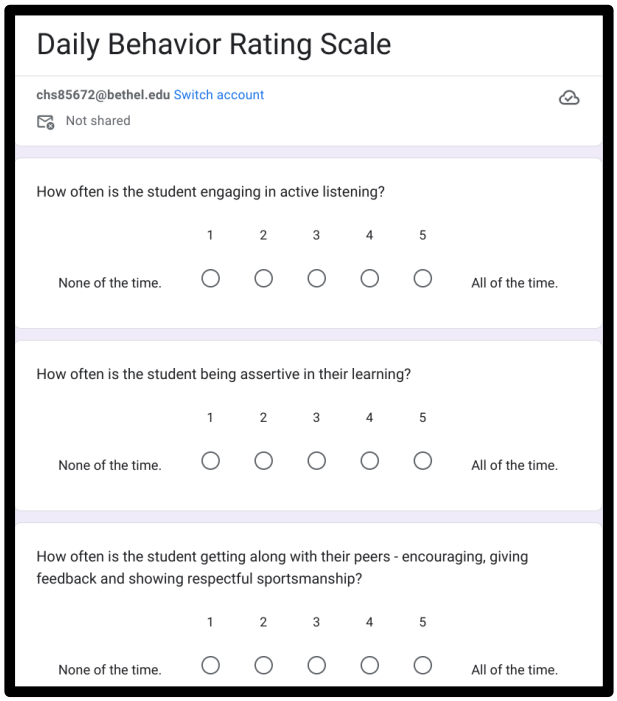
This curriculum would be written with the intent of students having the opportunity to interact with the content and activities daily. Some lessons would be formatted in a way that they build upon each other, referencing and utilizing skills previously taught. Recognizing that time for teaching social skills in a day is limited and the number of competencies and skills are vast, the same sport may be revisited throughout the curriculum, so that the rules of the sports game do not need to be taught, allowing for instruction to focus on a new social emotional skill. Due to this setup in the curriculum, some lessons may be required to be taught in a certain order, but the curriculum would also have opportunities for the teacher to select lessons as needed and teach them in the schedule allowed within the framework of their school's instructional model, understanding the need to differentiate and be as flexible as possible.

Data Collection - DBRS (Daily Behavior Rating Scale)

Daily Behavior Rating Scales create the opportunity to gather data frequently based on a student's behavior goals. This information can be collected at daily, biweekly, or weekly intervals, depending on need. Special education teachers and members of a student's IEP team can work together to determine the skill(s) or behavior(s) that need to be tracked. A helpful resource to select those skills from may be the Matson Evaluation of Social Skills for Youngsters (Matson et al., 1983). After those are determined, a tracking tool can be used to gather the data and then display the data to determine patterns, trends, and next steps to support a student with

their behavioral goals. Google Forms provides a format that can be supportive of this data collection process.

Exemplar


Daily Behavior Rating Scale

chs85672@bethel.edu Switch account

Not shared

How often is the student engaging in active listening?

	1	2	3	4	5	
None of the time.	○	○	○	○	○	All of the time.

How often is the student being assertive in their learning?

	1	2	3	4	5	
None of the time.	○	○	○	○	○	All of the time.

How often is the student getting along with their peers - encouraging, giving feedback and showing respectful sportsmanship?

	1	2	3	4	5	
None of the time.	○	○	○	○	○	All of the time.

CHAPTER IV: DISCUSSION AND CONCLUSION

SUMMARY OF LITERATURE

The literature review examined research related to physical activity and how it impacts students receiving special education services. There are three different types of physical activity that are recommended for fitness: aerobic, musical strengthening, and bone strengthening. Physiologically, blood flow is increased during these movement activities, and endorphins can be released, which may release stress and encourage a calm mood (Tara, 2005). Other benefits associated with physical activity include improvements in memory, attention, impulse inhibition, and executive functioning skills (Liu & Nusslock, 2018). Positive health implications include muscular endurance, bone strength, and support of cardiometabolics (Piercy et al., 2018).

Physical activity is an essential component of a healthy lifestyle, and youth today do not regularly engage in the recommended sixty minutes daily (CDC, 2019). Since children spend about 55% of their day doing sedentary activities and much of that time is at school, it is, therefore, a great setting for increasing physical activity. Additionally, many studies have found that physical exercise is connected to positive behaviors at school, including on-task behaviors, active listening, self-control, and engagement (Mahar et al., 2006; Havey et al., 2017).

For students with ADHD, physical activity supported an increase in response inhibition after being physically active. This activity also may support brain growth and connections (Christiansen et al., 2019). Youth with ASD showed a decrease in problematic behaviors after engaging in physical activity. In children with EBD, exercise has also proven beneficial when used throughout the school day for decreasing challenging behaviors. Using physical activities as a way to teach social skills was highly effective in decreasing undesired behaviors and increasing social skills for students who were on the autism spectrum or with emotional and behavioral challenges (Canella-Malone, 2011).

There are a variety of strategies for incorporating physical activity into academics that have been proven to be beneficial for learning. These strategies include inserting 1-10 minutes of moderate physical activity throughout the school day; others have included longer periods of exercise before school. Other strategies look at taking academic concepts and making some of the learning activities include physical movement. For students with ADHD, ASD, and EBD, where social behavior goals are written into the IEP, learning social skills through physical movement has been extremely beneficial.

LIMITATIONS OF RESEARCH

Although the concept of incorporating movement into learning is not new to instructional pedagogy there are definite limitations of research. One of the most significant limitations is the fact that the potential for recent research was impacted greatly by the coronavirus pandemic. With distance learning, as well as required social distancing and masking, physical movement and interactivity were restricted. Additionally, since many students were not at school sites for periods of time during the last three years, school exercise programs and opportunities could not be provided or monitored when students were at home for their schooling. Also, when students were able to participate in onsite learning, academic subjects were frequently prioritized because of the interrupted learning that they experienced. Much of the most current research that was tied to physical activity looked at how movement can be incorporated into distance learning or how to use virtual reality to engage in movement, neither of which is relevant for the in-person, at-school application of movement to support academics.

When considering the neuroscientific elements of exercise, a limitation of research is the ability to measure potential brain growth. Current research has studied mice and rats, but there are not yet medical tools technologically advanced enough to make concrete human assessments.

In investigating physical activity and specific disorders there is limited research focused on using physical movement or exercise as an intervention for youth with ASD and EBD. There is much potential for more research in this area, especially including research with larger participant sizes.

IMPLICATIONS OF FUTURE RESEARCH

As the needs of students continue to shift and change, it is likely that research will continue to investigate interactivity, physical movement, and how they impact academic and behavioral learning. Schools have been determined as excellent locations for physical and other

health interventions, which opens the opportunity to continue investigating how this physical activity impacts students academically and behaviorally (Mainsbridge et al., 2014). Going forward more research regarding both intensity and duration will be beneficial and how the age of the student affects the benefits of physical activity within the school setting.

In recent years, a spotlight has been brought to mental health and its tie to physical health as well. Movement plays an important role in the wellbeing of youth. As state lawmakers are starting to focus educational policies more on the health of youth, there will likely be more opportunities to research the impact of physical exercise in the school setting due to more movement programs being put into place and funding for them becoming more available. The results of these students could then prompt more mandatory exercise opportunities, perhaps even specifying the frequency or amount of time that youth should engage in movement throughout their school day.

PROFESSIONAL APPLICATION

Like any application of research or intervention, the importance of full implementation done with fidelity cannot be emphasized enough. The occasional incorporation of movement within the instructional model for students receiving special education services will not produce the same results as a consistent application with academic and social/emotional/behavioral learning. Because interactivity and physical movement within the classroom can appear to be less structured, teachers using these strategies need to be committed to establishing strong routines and explicitly stated expectations. Accommodations may need to be made for students who do not have a full range of movement or need to be scaffolded to build physical stamina; however, the need for these modifications should not be a barrier to applying these research-based practices.

As a special education teacher, I have already begun incorporating interactivity and physical movement into the days of the students on my caseload and in my classes. Scheduled walking breaks have been added to some students' schedules. I created a probability math unit that incorporated shooting baskets. On our school-wide recharge days, I have been offering soccer and some other sports as activities. The school schedule and class/standard requirements can make it difficult to incorporate activity within the day, so to truly continue the application of this research, it will take creativity and looking for small windows of opportunity.

CONCLUSION

I began this journey noticing both my personal draw to physical activities and the desire of my students to move. This made me question how movement and physical exercise support growth in students receiving special education services. Extensive research shows that the human brain is wired to respond to physical movement in ways that can benefit academic and behavioral growth in students, including those who meet the criteria of special education disabilities. As educators, it is necessary to then take these research-based findings and utilize them in our instructional methods with students in order to foster growth. In meeting the needs of the exceptional students I work with, I must draw upon creative, new, and different research-based strategies to ensure my students reach their greatest potential.

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