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## **Movement Matters: The Importance of Incorporating Movement in the Classroom**

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Movement Matters: The Importance of Incorporating Movement in the Classroom

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Northwestern College

A Literature Review Presented

in Partial Fulfillment of the Requirements

For the Degree of Master of Education

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### Abstract

This literature review looks at what movement is and how it can improve student learning. Journal articles written in the last ten years were evaluated to find common themes that support incorporating movement throughout the school day including at recess, during physical education, and in the classroom. Brain research shows that moving while learning is beneficial. Movement ignites areas of the brain as well as improves neuron connections, helps to develop different areas of the brain, and offers a variety of mental health benefits such as lowered anxiety and depression. In addition, movement helps to prevent long term diseases such as diabetes, stroke, and heart issues. It also looks at different means to integrate movement throughout the day. These include recess time, brain breaks, mindfulness and more. Movement is an important part of early childhood and the benefits of incorporating it at any early age are explored. From there, it offers ideas for future research and areas that have yet to be discovered in terms of incorporating movement into the classroom.

### Movement Matters: The Importance of Incorporating Movement in the Classroom

A classroom is a place where children spend nearly one third of their day. The majority of this time students are listening, working, and writing. This also means they spend the majority of their time sitting (Savina et al., 2016). According to Savina et al. (2016), children spend six to eight hours a day sitting, and forty-three minutes of every hour is spent in sedentary activities like sitting and listening. Sitting for long periods of time can cause students to have difficulty focusing and become inattentive. It also has negative health effects, with studies showing that after sitting for twenty to thirty minutes, eighty percent of the blood in the body pools in the hips (Stevens-Smith, 2016a). It is harder for new learning to occur without fresh oxygen in the blood (Stevens-Smith, 2016a).

Research has shown that when a child's body is involved in movement, the brain is in a higher state of arousal (Stevens-Smith, 2016a). According to Stevens-Smith (2016a), children learn best when moving because it stimulates the neurons and electrical wiring in the brain. The part of the brain that processes movements and actions is the same part of the brain that is responsible for and processes learning (Stevens-Smith, 2016a). Because of this, when movement and cognitive development is combined, it increases the number of neurons being used, and over time, will allow them to become more efficient (Stevens-Smith, 2016b).

Research has been conducted about how active engagement can improve learning in a variety of areas. Active engagement is a combination of knowledge, cognitive strategies, social interactions, motivation, movement, and conceptual knowledge (Stevens-Smith, 2016a; Chandler, 2015). Because of how the brain is wired and functions when movement is introduced, there are links between movement and improved cognition (Furmanek, 2014).

There are many ways to help increase movement in the classroom and throughout a child's day. These are things such as recess, mindfulness, learning through movement and flexible seating. Giving students opportunities for structured and unstructured physical activity breaks during the day can help improve academic achievement as well as prevent chronic diseases (Perera, Frei, Frei, & Bobe, 2015).

Further research needs to be conducted to find out what types of movements and how often movement can be incorporated in the classroom. Topics that can be studied and further developed are ideas of movement while working independently. While brain breaks, recess, and mindfulness have already been explored, there are more ideas yet to be discovered. Options like flexible seating are very popular and a current trend in education, and further studies into their use in the classroom may suggest whether it is beneficial or not. Along with that, it can explore the benefits of different seating options like wobble stools, seat discs, typical chairs and more. Research can also look at how a teacher or school can give students the movement that their body seeks, giving them the ability to focus, learn, and grow (Stevens-Smith, 2016a).

While there have been studies (Shoval, Sharir, Arnon, & Tenenbaum, 2018; Chandler & Tricot, 2015; Stevens-Smith, 2016) conducted that support the idea that including movement into active learning can enhance a child's ability to retain information, there is a trend that is sweeping education that needs further research. With the current push for required minutes in certain subjects and the common core pushing standards, movement options have been reduced. Flexible seating is a new concept in the education world that is popping up in schools across the United States. Flexible seating promotes movement while children work, throwing away the traditional seat. Further research needs to be conducted to determine if flexible seating is an

appropriate way to incorporate movement in the classroom. Further research needs to be conducted to determine if things like brain breaks are of benefit as well.

### **Review of the Literature**

In order to understand why movement matters in the classroom, movement must first be defined. Movement can also be considered as, or called, physical activity or active engagement. Active engagement is a combination of knowledge, cognitive strategies, social interactions, motivation, movement, and conceptual knowledge (Stevens-Smith, 2016a; Chandler, 2015). The cognitive, emotional and physical pieces of active engagement help children retain what they have learned as well as process what they are learning (Steven-Smith, 2016b). According to Shoval, Shirir, Arnon, & Tenenbaum (2018), incorporating movement into the learning process activates kinesthetic perception and allows learning to take place. Activities that incorporate movement can appeal to young students in a variety of ways both in and out of the classroom, including outdoor games, aerobics, coordination exercises and team sports (Savina, Garrity, Kenny, & Doerr, 2016). Along with this, team sports have major pieces including social and strategic planning that can improve executive functions (Savina et. al., 2016).

### **Theoretical Frameworks**

John Dewey's theories have been instrumental in the mindset of learning through doing (Leshkovska & Spaseva, 2016). This theory lends itself to the idea of children learning through movement. His theory promoted a child-centered way of doing things, which was based on key ideas. One of these ideas is that activity is an essential piece of a child's nature, which can be shown through instincts, experience, individuality and interests (Leshkovska & Spaseva, 2016).

Approximately eighty years after John Dewey came out with his theory, Howard Gardner developed his theory of multiple intelligences. This theory suggests that learners have seven

different types of learning styles, as opposed to the previously thought of idea that intelligence is one entity (Leshkovska & Spaseva, 2016). Gardner would later add one more, bringing eight total intelligences: interpersonal, intrapersonal, bodily-kinesthetic, musical, spatial, logical-mathematical, linguistic, and naturalist (Leshkovska & Spaseva, 2016). This theory eventually led to educators questioning their teaching style, causing a change in the way educators approach things like curriculum, pedagogy, assessments and learning differences (Leshkovska & Spaseva, 2016).

Brian Sutton-Smith was a theorist that believed children have the ability to develop a large network of neurons that will go away if they are not used (Stevens-Smith, 2016b). He also believed that these neurons create the foundation that help children develop language, pursue creativity, and help to create problem solving skills (Stevens-Smith, 2016b). All of these things were also important in the idea of incorporating movement into learning.

### **Brain Research**

Movement in the classroom is important for many reasons, and there is a lot of research to back up the benefits of physical engagement, especially in early childhood (Stevens-Smith, 2016a). Exercise can have many positive effects on a growing brain, and results from brain scans shows that a child does their best learning when they are moving around and active (Stevens-Smith, 2016b; Chandler & Tricot, 2014). Moving the body can have a very positive effect on a child's learning and their ability to achieve academically (Chandler & Tricot, 2014).

Research has shown that when a child's body is involved in movement, the brain is in a higher state of arousal (Stevens-Smith, 2016a). Regular exercise and movement causes physiological changes that help with memory and release neurotrophins that help with processes in the brain (Chandler & Tricot, 2014; Archer & Siraj, 2015) Research conducted on animals has



shown that movement and exercise improves cognitive function, improves memory and helps with learning, as well stimulates neural development and produces more capillaries (Archer & Siraj, 2015; Abadie & Brown, 2010). Many practitioners think that the relationship between specific movement patterns and developing neurons influence later academic achievement (Archer & Siraj, 2015).

The cerebellum acts like a switchboard for all of the brains thinking; it can play into how learning and development happen in a number of ways (Stevens-Smith, 2016b). In addition, there are links that connect decision making, emotions, attention, memory and the cerebellum (Stevens-Smith, 2016b). When a child takes in stimuli or experiences around them, they are changed into electrical or chemical impulses that move to the thalamus, which is the organ in the center of the brain (Rushton, 2011). From there, the thalamus sends the stimuli to one of four lobes in the brain (the occipital, the temporal, the parietal and the pre-frontal) or the motor cortex for more processing (Rushton, 2011). The part of the brain that processes movement is the same part that processes things like learning (Steven-Smith, 2016b; Stevens-Smith, 2016a). In fact, according to Steven-Smith (2016b), the part of the brain that lights up when a child moves is the same part of the brain that lights up when they read or work on math. Sensorimotor processes and cognitive processes are very intertwined (Chandler & Tricot, 2014). Movement awakens the neurons and electrical wiring helps with a child's ability to receive new learning (Stevens-Smith, 2016a).

When cognitive development is put together with physical activity or engagement, neurons in a child's brain grow and begin to attach to other neurons, which allows those neurons to become quicker at sending messages to each other (Steven-Smith, 2016b; Stevens-Smith, 2016a). When a student is learning, neurons are growing and connections are improving, as well

as when physical activity is taking place (Steven-Smith, 2016b; Stevens-Smith, 2016a). Aerobic exercise improves the brain's ability to activate, making working memory and processing speed more efficient (Savina et al., 2016).

The brain also needs fresh oxygen in the blood along with water to function well (Steven-Smith, 2016b). The brain takes the most oxygen out of any other organ in the body, and it is essential for learning (Steven-Smith, 2016b). Learning becomes more difficult without blood that has fresh oxygen, as eighty percent of the blood pools in the hips after a half an hour (Stevens-Smith, 2016a).

Knowing that brain function and movement work closely together (Steven-Smith, 2016b; Stevens-Smith, 2016a; Chandler & Tricot, 2014; Archer & Siraj, 2015), movement can be instrumental in a child's learning. A child's development is holistic (Furmanek, 2014). They need to actively participate in their learning and use all the senses or as many senses as possible to help them understand their world (Pica, 2010). There are links to physical activity and movement leading to better cognition, including a positive effect on learning (Furmanek, 2014). Children who have an active lifestyle have more gray matter volume in the hippocampus and basal ganglia, and more white matter integrity, as well as more effective patterns in brain activity (Chandler & Tricot, 2014). Movement is also a good way to improve a child's mental functioning, which is important to their cognitive development (Chandler & Tricot, 2014).

When a child is physically moving, their brains are creating neurological foundations that help with creativity, problem solving and language development (Stevens-Smith, 2016a). Children who complete repetitive movement patterns stimulate or activate their certain areas of their brain (Archer & Siraj, 2015). Incorporating physical engagement can increase connections made during learning (Steven-Smith, 2016b). Recent findings have suggested that there may be

a positive correlation between memory and movement (Kirk, Vizcarra, Looney, & Kirk, 2014; Savina, Garrity, Kenny, & Doerr, 2016; Shoval et al., 2018). Chronic aerobic exercise encourages cerebral blood volume in the hippocampus, which allows for memory and learning (Savina et al., 2016). Implicit learning creates more meaning for a child and opens up the opportunity for neural networks to be created as well as invites more of the child's senses to be used (Pica, 2010).

### **Lifestyle Changes**

In addition to the brain research, there are reasons to make movement a priority in early childhood classrooms. Over the last ten years, a lot has changed. The world has turned to machines to get things done, which while improving the quality and standard of living, has also created a large problem: sedentariness (Abadie & Brown, 2010). The United States of America has utilized technology to help make life easier, and it has also increased the standard of living in the U.S., causing more and more Americans to live a sedentary lifestyle (Abadie & Brown, 2010, Savina et al., 2016). The lifestyle of a sedentary person can lead to diseases such as diabetes, stroke, lung disease, cancer, and cardiovascular disease (Abadie & Brown, 2010).

Even in early childhood, children spend around forty three out of sixty minutes sitting or completing some type of sedentary activity (Savina et al., 2016). In education the amount of a time that children are asked to sit in a desk or table spot and focus on a task is quite cumbersome (Wiebelhaus & Hanson, 2016). Students sit for around six to eight hours a day (Savina et al., 2016). A program that encourages physical activity in the classroom could help with the growing problem of childhood obesity in the United States as well as any and all diseases that go with childhood obesity (Abadie & Brown, 2010).

In general, most people around the world recognize the benefits that movement can have for both their mental health and their physical health, but even so, most people are becoming less active (Stevens-Smith, 2016b). Even though there is an inherited genome to support chronically active lifestyles, the average American is becoming less and less active (Savina et al., 2016). Consistent physical activity can lessen the risk of acquiring diseases like cancer and obesity (Robinson & Wadsworth, 2010).

A recent study also discovered that children who had less screen-time and higher levels of physical activity had fewer symptoms of depression (Savina et al., 2016). Children are exposed to an abundance of stimulation with things like video games and computers (Rushton, 2011). There has also been a reported rise to the number of children who are diagnosed with ADHD, increasing from 2003 to 2011 (Wiebelhaus & Hanson, 2016). This means that more children in schools are experiencing things like impulsive behavior, difficulty staying on task, and being overly active (Wiebelhaus & Hanson, 2016).

Learning can be made better by incorporating movement because it lowers anxiety, stress, and depression as well as boosts up a child's self-esteem (Savina et al., 2016). The United States consumes more ADHD medicine than any other country in the world and prescriptions for anti-depressants are on the rise (Martin, Farrel, Gray, & Clark, 2018). A recent study linked obesity in children to the amount of time of unstructured and structured activities in American schools (Perera et al., 2015). Children in early childhood spend around eighty percent of their day sitting or being stationary even when they were given the chance to participate in outdoor and indoor movement opportunities (Robinson & Wadsworth, 2010).

## **Legislature**

Most schools have not responded to or acted on the brain research that supports using movement in classrooms to help with cognitive improvements (Stevens-Smith, 2016a). A large factor to this has to do with legislature (Savina et al., 2016; Perera et al., 2015; Martin et al., 2018; Abadie & Brown, 2010). In 2001, the United States Congress passed a program called No Child Left Behind, or NCLB (Wiebelhaus & Hanson, 2016). This required states to create new standardized tests for students as well as mandated that all teachers be or become highly qualified (Wiebelhaus & Hanson, 2016). In order for states to get the funding needed for education, all students had to take these tests at certain grade levels (Wiebelhaus & Hanson, 2016). Since No Child Left Behind was put into law, there has been great pressure put on schools to make sure their students performed at or above grade level (Martin et al., 2018, Abadie & Brown, 2010). Administrators increased the amount of instructional time required in response to NCLB so that all curriculum could be taught as well as improve student scores, which caused a shift in the amount of time students spent at recess and in physical education classes (Martin et al., 2018).

In order to help relieve the stress and expectations, many schools chose to eliminate or minimize recess time in order to increase instructional time (Martin et al., 2018). According to Savina et al. (2016), and Perera et al. (2015), this greatly reduced the amount of recess time for students. Since 2001, when No Child Left Behind was enacted, physical education and recess time has been decreased in elementary schools by almost half (Savina et al., 2016). Only around four percent of students in elementary schools, around eight percent of students in middle schools, and around two percent of students in high schools get physical education for the whole school year (Savina et al., 2016).

Those who do receive physical education in their school have seen a reduced number of minutes per week. From 2001 to 2007, the length of physical education classes in elementary schools went from 145 minutes a week to only 105 minutes a week (Perera et al., 2015). Recess time was also decreased during this period going from an average of 183 minutes a week in 2001 to 133 minutes per week in 2007 (Perera et al., 2015). Currently, there is no nationwide mandate for the number of minutes a student must spend at recess in the United States or in physical education classes, nor do they require breaks for physical activity (Perera et al., 2015). However, some states such as Oregon, have passed legislation in regard to movement (Perera et al., 2015). This legislation requires that students spend at least thirty minutes a day in a physical education class in elementary school, which is now fully implemented (Perera et al., 2015). Only three states, including Oregon, have a mandate on physical activity in the classroom (Perera et al., 2015). The amount of time students spend at recess is currently a school by school decision, with state or districts requiring a minimum number of minutes that students get each day (Martin et al., 2018).

### **Movement Throughout the Day**

According to Rushton, there are four basic brain principles that allow for the understanding of how to teach young children (Rushton, 2011). They are as follows: every brain is uniquely organized, the brain is continually growing and adapting to the environment around it, a classroom must be brain-compatible to make learning a positive emotion, and brains need to be put into real and meaningful experiences (Rushton, 2011). If teachers are aware of how the brain works and functions, they will be able to incorporate movement into their day better.

Research suggests that preschoolers should be getting around one hundred twenty minutes of physical activity each day, with sixty of those minutes coming from structured

physical activity and the other sixty coming from unstructured free-play time (Robinson & Wadsworth, 2010; Savina et al., 2016; Kirk et al., 2014). The Active Start guidelines suggests that children ages three to five should be receiving at least sixty minutes of daily physical activity that is structured as well as participating in at least sixty minutes and up to several hours of unstructured physical activity and also to become proficient in movement skills (Wadsworth, Robinson, Beckham, & Webster, 2012). However, these early childhood students are getting less than the sixty minutes of moderate to vigorous physical activity required (Kirk et al., 2014; Savina et al., 2016; Robinson & Wadsworth, 2010).

In today's society with technology and convenience at a forefront, children have been pushed into a less active, more sedentary lifestyle with many opportunities to be still during the day (Stevens-Smith, 2016b). Students are only getting about half of the recommended physical activity they need each day (Robinson & Wadsworth, 2010). Specifically, only approximately four percent of schools require physical education classes in early childhood (Abadie & Brown, 2010). In fact, the National Wildlife Federation has reported that the average child is consuming around seven hours of screen time a day, while only getting approximately thirty minutes of unstructured outdoor play a day (Martin et al., 2018).

For students who are between the ages of six to seventeen years old, it is recommended that they receive sixty minutes or more of physical activity a day (Wiebelhaus & Hanson, 2016). A survey conducted in 2011 suggests that more than two thirds of American students do not meet the aerobic activity on a daily basis (Savina et al., 2016). The American Academy of Pediatrics says that recess should not be eliminated and that it is essential for a child's development (Wiebelhaus & Hanson, 2016). In addition, young children who completed fitness activities

more frequently performed better on memory tasks and had more hippocampal volume compared to young children who did not complete as many fitness activities (Savina et al., 2016).

### **Effects of Inactivity**

The inactivity that is being seen as early as preschool can have a big effect on children in elementary as well as their adult life (Abadie & Brown, 2010). The more active a child is when they are young, the more active their brains become and the more physical activity helps to develop the brain (Stevens-Smith, 2016a; Savina et al., 2016). A student who is physically active attains a higher level of academic achievement than those students who are inactive (Abadie & Brown, 2010). Students who are a part of a program that promotes physical activity are less likely to have health complications resulting from diseases (Abadie & Brown, 2010). The intensity of a physically active child and how they perform academically has been considered positive, including a relationship between movement, concentration, attention, spatial perception and memory (Shoval et al., 2018).

### **Benefits of Movement**

Physical activity and movement have also been linked with a range of psychosocial benefits including lowered anxiety levels, and higher self-esteem (Robinson & Wadsworth, 2010, Abadie & Brown, 2010). Studies have also found that incorporating physical activity has an effect on a child's mental health, although it is small (Savina et al., 2016). Young children that participated in more physical activity and had less leisure screen time had lower levels of depressive studies (Savina et al., 2016). In addition, early childhood students learn how to demonstrate solutions to problems with movement (Steven-Smith, 2016b). They also begin to lay the foundation for self-regulation (Williams, 2018). Movement also helps children learn boundaries (Furmanek, 2014). If physical activity is implemented in the classroom, it can also



help with the growing problem of childhood obesity and other diseases that coincide with it (Abadie & Brown, 2010).

If the foundation for incorporating physical activity into learning are set at an early age, such as pre-school, then children can enter their early elementary years with a toolbox filled with ways to cope with the high demands placed on them today which include hand-eye coordination, eye control, and sitting to concentrate (Archer & Siraj, 2015). Movement has had a positive effect on memory, concentration, and behavior (Steven-Smith, 2016b). Students who have a high level of aerobic activities have better reading scores in comparison to students who are less fit (Furmanek, 2014). Whenever a student moves in an organized way, the brain is fully activated and begins to integrate information, opening the door to learning (Stevens-Smith, 2016a).

When physical activity and movement opportunities are provided to students, they develop not only the physical piece of their body, but also the cognitive piece (Steven-Smith, 2016b; Stevens-Smith, 2016a). Linking movement to teaching helps to establish a body and mind connection that allows students to improve their learning (Furmanek, 2014). Children's brains need movement or physical activity breaks to help them process new learning after direct and intense instruction (Perera et al., 2015). However, there has been little research conducted in regard to incorporating physical activity or physical activity breaks into the classroom (Wiebelhaus & Hanson, 2016).

### **Incorporating Movement into Schools**

There are many ways to include movement into a child's day, starting with recess. When thinking about movement, research has been conducted in mainly two areas that include recess as well as physical education (Martin et al., 2018). According to the Center of Disease Control, recess is a set time during the school day that lets students engage in unstructured physical

activity and play (Wiebelhaus & Hanson, 2016). Recess is important because it helps a child develop their cognitive and social skills (Martin et al., 2018).

During recess, children are encouraged to build relationships, develop teamwork skills, interact with their peers, as well as live out what they are learning (Wiebelhaus & Hanson, 2016; Martin et al., 2018; Philips et al., 2015). Recess is also a time when students work at building social skills, especially for young students (Martin et al., 2018). In addition, unrestricted free play outdoors helps the child have an easier time focusing and perform better in the classroom (Martin et al., 2018).

After students have had recess, teachers reported that the students appeared calmer, more at ease, and had an easier time remaining in their seats (Martin et al., 2018). The students are also able to attend to tasks with greater ease and efficiently attend to cognitive tasks (Wiebelhaus & Hanson, 2016). According to Wiebelhaus & Hanson (2016), on days when students did not receive recess, the average of students who exhibited inappropriate behavior was more than two thirds, while on days with recess, inappropriate behavior was only exhibited by around one third of students (Wiebelhaus & Hanson, 2016). Students who have had unrestricted play outside aids with children's eyesight as well as their classroom performance (Martin et al., 2018).

Physical activity based in the classroom helps to integrate movement into the day (Martin et al., 2018). Movement includes using quick brain breaks or active lessons that help to mix physical activity with lesson delivery (Martin et al., 2018). Using activities that incorporate movement into the academic subject area being taught, even for as little as five to ten minutes, allows children to move in their seats (Savina et al., 2016). These breaks should require little to no set up making them quick and easy to do in a classroom (Wadsworth et al., 2012). They

should also include a quick review of rules and expectations, especially in the early childhood setting (Wadsworth et al., 2012).

Implementation of an energizer program, or a program that helps encourage movement while in the classroom, made for a considerable increase in the number of steps that children took throughout the day (Philips, Meister, Johns, Bears, & Hamm, 2016). Not only that, Philips et al., (2016) stated that it did not interfere with the teacher's ability to use instruction time, and that more classrooms could introduce these breaks into their daily routine. Other programs have been designed and tried in the classroom like Boost Up and S.M.A.R.T. These programs are designed with certain movements that help stimulate the brain in areas such as vestibular motion and mobility skills (Wiebelhaus & Hanson, 2016).

Another way to incorporate movement into a child's day as well as into their classroom is through mindful movements. Mindful movement can help with cognitive function as well as improve learning, which has led to recommendations that it be implemented into kindergarten classrooms (Shoval, Sharir, Amon, & Tenebaum, 2018). Using mindful movement as a scaffold, students are able to work independently and solve problems, as well as allow students to interact with each other to show new learning, both visually and kinesthetically (Shoval et al., 2018). Students who were exposed to mindful movements reached a higher level of academic achievement in comparison to students who engaged in other physical activities (Shoval et al., 2018). Shoval et al. (2018), found that mindful movement can impact learning in a positive way as well as encourage brain performance, even recommending that it be put into action in kindergarten classrooms.

Physical activity breaks in the classroom have also been utilized to help increase movement within a child's day. In order for students to stay or sit completely still, it is dependent

on the motor skill level they are at (Wiebelhaus & Hanson, 2016). The ability to stay completely still is a very advanced motor skill (Wiebelhaus & Hanson, 2016). With that being said, physical activity breaks can improve a child's behavior because it promotes better concentration scores, less fidgeting, and on-task behavior (Kirk et al., 2014). Improvements in attention-to-task have resulted when intermittent physical activity breaks have been utilized in elementary schools (Kirk et al., 2014). Giving students opportunities for structured and unstructured physical activity breaks during the day can help improve academic achievement as well as prevent chronic diseases (Perera, Frei, Frei, & Bobe, 2015).

According to Wiebelhaus & Hanson (2016), students are facing extended academic instructional time, which offers challenges to students, especially students who may have Attention Deficit Hyperactivity Disorder, or ADHD. In order for students to spend more time engaged throughout instruction, periods of movement are necessary (Wiebelhaus & Hanson, 2016). One to two-minute activities that allow students to cross the midline allow fresh blood with oxygen to travel to the brain, improving learning in all four lobes of the brain (Stevens-Smith, 2016a). They also give energy to both sides of the brain and can easily be incorporated into whatever type of learning that is occurring (Stevens-Smith, 2016a). In addition, classroom based physical activity breaks can produce educational benefits which include increased time on task, better attention, and an improved classroom climate (Martin et al., 2018).

Brain breaks or brain gyms is another term for physical activity breaks in the classroom. They have also led to improvements in some areas, including a decline in the number of nurses' visits, a decrease in ADHD and asthma medicine, and excess weight gain (Philips, Meister, Johns, Bears, & Hamm, 2016). According to Philips et.al (2016), more classrooms should consider implementing exercise breaks into their day, as these breaks did not interfere with the

amount of classroom instruction time students received. Brain breaks or brain gyms also help improve coordination and learning (Stevens-Smith, 2016a). According to Wadsworth et al. (2012), the best time to utilize a classroom brain break or physical activity is during transitional time, like in between two activities or from a large group activity to a small group activity.

Teachers who implemented some form of a classroom based physical activity, on average, took about a total of five minutes each day (Martin et al., 2018). However, allocating ten minutes each day is considered best practice (Martin et al., 2018). A theme that showed up in the research when looking at teachers implementing physical activity breaks, was a need to get or have reassurance from an administrator that it is okay to take instructional time to complete these activities (Martin et al., 2018). This could be a reason as to why there has not been more implementation in school systems. There are other countries in the world who have already implemented these kind of breaks for ten to twenty minutes for every forty to fifty minutes of instruction time, and they have higher scholastic scores than the United States (Perera et al., 2015). In addition to the higher scores, the schools that participated in frequent brain breaks also reported that students made fewer trips to the nurse's office and a need for less ADHD medicine to be consumed by students (Perera et al., 2015).

Another way to implement physical activity into the classroom is incorporating it through teaching, such as using hand motions, gestures, etc. Using gestures while learning in many areas including math has had positive effects (Chandler & Tricot, 2015). It can be assumed that doing an action or gesture in response to hearing or seeing new information can give the student's memory additional tools to retrieve that information later (Chandler & Tricot, 2015). According to Savina et al. (2016), using hand movements while learning leads to a higher retention rate of what is being taught. Savina et al. (2016) also suggests that when movement is included to help

process information, it may actually reduce the cognitive load by off-loading the working memory signs to the sensory-motor system.

Chandler & Tricot (2015) said that using body movement and hand gestures can be extremely beneficial when compared to studying or listening to direct instruction in the area of basic math. Chandler & Tricot (2015) also looked at the type of movement incorporated in the classroom and found that physical exercise had a greater effect when incorporated in the classroom, specifically when it worked with whatever skill was being taught. There was also confirmed reports of a positive result when incorporating language with gestures (Chandler & Tricot, 2015).

With any strategy or method implemented into the classroom, it is important to recognize that behavior management is essential to success, especially in the early childhood classroom (Furmanek, 2014). Children many need the activity modeled at first, as well as a clear boundary set for their space such as a taped area, a defined shape, or an area marked off with cones (Furmanek, 2014).

### **Early Childhood Benefits**

While all of these ideas are beneficial for students, it is important to look to the benefits it can have specifically on early childhood classrooms. According to Stevens-Smith (2016b), the period of time from conception to around eighteen months is when movement is as important as good nutrition. Most children who are of the ages three to five spend a large portion of their day in an early childhood school or an early childhood center, where teachers can positively or negatively affect a physically active and healthy lifestyle (Robinson & Wadsworth, 2010). Kirk et al. (2014), found that most early childhood teachers do little to encourage a child's participation when it comes to incorporating movement into outdoor physical play.

Knowing this, research has shown that patterns that promote being physically active are set early in life (Abadie & Brown, 2010). Children become more literate in the area of physical activity when movement experiences are integrated in the early childhood classroom (Furnmanek, 2014). They need to experience learning with as many senses as possible (Pica, 2010). A lot of curriculums in early childhood use a center model, where there is frequent movement (Wadsworth et al., 2012). This makes incorporating movement transitions between centers or stations easier than a typical classroom that isn't center based (Wadsworth et al., 2012).

Students also spend a large portion of their day playing, which is essential to developing the social, emotional, cognitive, and physical well-being of said students (Steven Smith, 2016a). When incorporating physical activity into the early childhood center, the focus should be on expending calories with highly physical activities such as running and jumping (Abadie & Brown, 2010). When physical activity was included in Head Start classrooms through academic sessions, it offered an approach to also increase the amount of physical activity that students were getting (Kirk et al., 2014).

According to Abadie & Brown (2010), it is obvious that early childhood programs should be integrating physical activity into their academic time, such as transition times, during academic periods, and outside at recess. In addition, most early childhood centers incorporate songs and movement already, which are great neurological exercises that are essential to brain development (Pica, 2010). In early childhood, it is especially important to consider a child's developmental stage when planning activities (Furmanek, 2014). Simple activities that can often get overlooked, like spinning, rolling, and jumping help to stimulate systems that interact to help keep a child's balance and coordination (Steven-Smith, 2016b). If the foundations for physical

activity are laid early on in the pre-school years, then children will be able to cope better with the demands that come along with learning as they grow (Archer & Siraj, 2015). They will be able to better control eye movement, their hand-eye coordination, and have an easier time sitting and concentrating (Archer & Siraj, 2015).

### **Opposing Viewpoints and Conflicts**

One opposing argument or conflict to incorporating movement is that not enough research has been done on the subject of movement in the classroom and the results of the research that has been done is inconsistent and does not consistently line up with increasing academic performance in subjects like reading and math (Savine, et. al., 2016; Abadie & Brown, 2010). Further research could be conducted on why there are different effects of movement in different content areas (Savine, et. al., 2016). This could mean conducting research in content areas, then comparing results to see if there is consistency between the two. If the same strategies are applied in reading, math, and social studies, the results should provide consistent data. If not, it opens up doors to more questions and yet further research. However, this would not disprove that movement has benefits that can improve learning, it only points to conducting more research.

Another argument that can be made against incorporating movement in education, specifically early childhood education, is that there is not a clear agreement with neuroscientists about how the brain science links to education (Archer & Siraj, 2015). This argument, like the others, suggests that more testing needs to be completed before there is a viable solution or answers for teachers to follow to guarantee results in their classroom (Archer & Siraj, 2015). However, Archer & Siraj (2015), also discredit the argument by offering the idea that using brain



research could alter the way that children are taught and offer new programs and educational strategies that streamline learning.

### **Impact on Students, Teachers and Schools**

This research will impact students and teachers in many ways. First, at the district level, the amount of time provided for recess and physical education needs to be reexamined. The district will need to first find out how much time they are giving all grade levels for physical education and recess. Obviously, the time will vary depending on the grade level, but schools should be ensuring that all students are getting, at the very minimum, some time in their schedule for physical activity. If they are not, the district should be looking into how their schedule can be altered to include the much needed and beneficial physical activity into each student's day. Along with that, the district should implement a set time for recess based on the grade level and/or ages of students. The research that has already been conducted will help them guide their regulations moving forward.

At a teacher level, each teacher can begin thinking about small things they can do each day to implement movement into their classroom. While this literature review provides ideas as well as benefits from each, there are many options that are yet to be explored. The research should cause teachers to pause and think about the benefits movement has in the classroom with little extra work.

Lastly, this will impact students the most. While students may not realize it, a change in their routine, even for a few short minutes every hour, will greatly benefit them. When students start moving throughout the day, they will experience many benefits they may not even be aware of. These benefits will not only improve their learning today, but also help them well into their adult lives.

### **Areas of Future Research**

*Flexible seating.* One area that could be further researched is a trend that is taking over elementary classrooms throughout the country: flexible seating. Flexible seating is the idea that students can choose where and how they learn best. This incorporates movement because most options provide opportunities for students to move. For example, types of flexible seating are things like stability balls, wobble seats, seat discs, cushions, yoga mats and more. According to Parnell (2013), the classroom environment is important and is really the third teacher in a student's learning. If this is true, than how and where a student learns is vital to their success in the classroom as well as their academic success. Research can look at how a teacher or school can give students the movement that their body seeks, giving them the ability to focus, learn and grow. (Stevens-Smith, 2016a).

More specifically, research could look at different types of flexible seating to determine if there is one option that gives students the ability to focus for longer periods over a different option. While some research has been conducted in this area, specifically stability balls, there is more to be done. For example, Savina et. al., (2016) has suggested that giving students a stability ball to sit on instead of a typical chair may help them to stay on task. However, there is so much more that can be investigated, researched and flushed out in the area of flexible seating. This includes giving students a choice of where and/or what to sit on when they are working. This could also play a factor into their ability to focus, while incorporating movement. If movement is incorporated while students are working, instead of simply during recess, physical education, and instruction time, what, if any, impact does this have their ability to stay on task and stay healthy?

*Movement During Instruction.* Another area that needs further research is movement while teachers give instruction. While there have been studies and research conducted in specific

content areas and with specific movements, a study that looks at a set movement strategy across content areas may be beneficial in determining if including movement into learning is of benefit and if academic scores will show it. Movement can easily be sprinkled into a day, spicing up a student's routine as if it were salt and pepper (Furmanek, 2014). These movement strategies could include but are not limited to actions with important concepts or words, walking or jogging in place while teaching, stretchy bands on chairs and more.

In addition, according to Chandler & Tricott, (2015), it is believed that using gestures can offload working memory. This would allow students to develop a deeper understanding of what is being taught (Chandler & Tricott, 2015). It can also be assumed that taking actions in addition to hearing or seeing it can give the brain more cues to help retrieve and represent knowledge that has been acquired (Chandler & Tricott, 2015). Research can be conducted further to determine if incorporating gestures while working indeed helps students learn. Things that can be looked at include crossing the mid-line, using different parts of the body, and different types of physical activity.

Overall, there is a lack of knowledge and understanding of why physical inactivity both outside of the classroom as well as during instruction improves academic performance (Savina et al., 2016). More can be done to study what the best practice is in this area as well as how to integrate movement into the classroom (Savina et al., 2016). In addition, researchers also need to consider in what ways those with physical disabilities can be included and incorporated into physical activity in the school setting (Savina et al., 2016). As a whole, the research community needs to continue to look at ways that physical activities and interventions can be implemented into the school setting due to the fact that children spend at least seven hours a day there (Philips et al., 2016).

### **Conclusion**

In conclusion, movement matters in a child's life during recess, physical education, and in their general education classroom. While children are getting activities throughout the day like recess and physical education, it is not enough. Movement and physical activity allow students to do their best learning, which results from brain scans suggest (Stevens-Smith, 2016b). In addition, many practitioners believe that the relationship between specific movements and developing neurons influence academic achievement (Archer & Siraj, 2015).

Brain research also finds a link between movement and the benefits it may have on a developing brain. When sensorimotor and cognitive processes work together, neurons in a child's brain grow and meld with one other, making them quicker and better at sending and receiving messages (Chandler & Tricot, 2014, Stevens-Smith, 2016a). Fresh oxygen is also provided during periods of movements, allowing the brain to function at its best (Stevens-Smith, 2016b). When children are physically moving, their brains are creating neurological foundations that help to develop and foster creativity, problem solving, and language development (Stevens-Smith, 2016a).

While brain research points to the benefits of using movement to strengthen the mind, lifestyle changes and legislature have affected how movement is viewed in the school setting. The average American is becoming less and less active (Savina et al., 2016). Movement can also help to lower anxiety, stress and depression as well as help to develop or boost a child's self-esteem (Savina et al., 2016). However, children spend nearly four fifths of their day sitting or incorporating little movement (Robinson & Wadsworth, 2010). In conjunction with lifestyle changes that American's have been seeing, legislature has placed pressure on schools to limit the amount of time students spend moving, instead using it as instruction time (Martin, et al., 2018).

No Child Left Behind, or NCLB, was passed in 2001 and required standardized testing for students and insisted that all teachers be highly qualified (Wiebelhaus & Hanson, 2016). This tremendously cut down recess time for many students and in some cases even eliminated it (Martin et al., 2018).

Results of the inactivity in schools effects students both now and into their future (Abadie & Brown, 2010). Students who become active or part of a physical activity program are less likely to have health complications from diseases (Abadie & Brown, 2010). Movement can help to lay the foundation of self-regulation and help children learn boundaries (Williams, 2018, Stevens-Smith, 2016b).

Incorporating movement into the day can be done in many ways including but not limited to recess, brain breaks, physical activity breaks, gestures and more, all provide ways for students to keep moving throughout the day. These things can be extremely helpful for children, especially those who may face ADHD (Wiebelhaus & Hanson, 2016). The best time to include or tie these ideas into the classroom is during transitional periods or between activities (Wadsworth et al., 2012).

Due to the research that has already been conducted, the next steps going forward is to look at how specific strategies can be applied in the classroom and how effective they can be. Movement has many benefits that can enhance and improve how students learn. The more that physical activity and movement is included in a child's day, the more active their brain will become (Stevens-Smith, 2016b). It is the job of the research community going forward to pinpoint and discover exactly what strategies can be replicated in classrooms so that all students can benefit from movement. In today's world where the American lifestyle is becoming less and less active, it is important to get students moving and active throughout their day (Abadie & Brown, 2010,

Savina et al., 2016). Learning with and through movement can be a great place to start and teach students beneficial habits from early childhood on that will help carry them into their adult lives.

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