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Elizabeth Hill

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Academic Advantages of Increased Classroom Movement in Kindergarten

Elizabeth Hill

Northwestern College

A Literature Review Presented
in Partial Fulfillment of the Requirements
For the Degree of Master of Education

Abstract

Modern kindergarten classrooms are academically rigorous learning environments with high expectations placed on young learners. Oftentimes, these students still receive an education based on traditional instructional strategies that no longer benefit and challenge young learners appropriately. This literature review examines the academic benefits of intentional classroom movement, kinesthetic learning, brain breaks and the impact they have on learning in the kindergarten setting. This literature review presents peer reviewed research studies conducted within the last ten years that investigate the most advantageous methods of movement incorporation in the classroom. The findings of this literature review conclude that, by increasing classroom movement, students benefit with greater cognitive ability, increased executive functioning skills, demonstrate higher levels of engagement, and can retain more academic material. In conclusion, current kindergarten classrooms benefit from and should integrate intentional movement, kinesthetic learning, and brain breaks as best practice instructional strategies to educate young learners appropriately.

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Academic Advantages of Increased Classroom Movement in Kindergarten

The academic rigor and increased expectations in the kindergarten classrooms have created a highly intensified learning environment for young children. Skills that were once introduced in older grades have shifted down to the kindergarten level. With each revision of the state and national standards, the kindergarten classrooms, filled with children between the ages of five-and-six, are expected to learn with increased expectations and more complicated academic material within a more rigorous learning environment. However, many of the traditional classroom practices, routines, standards, and procedures remain the same. Classrooms still tend to be teacher-centered with instructional strategies that require the students to receive information stagnantly and passively while lacking a modern style that is conducive to young learners. This traditional learning style is not beneficial to the modern learning styles of kindergarten students. Many classrooms demonstrate the same standardized structure and layout that has been utilized for over one hundred years (Killbourne et al., 2017). Primary learning experiences need to be engaging, interactive, and meaningful while allowing opportunities for young children to be physically active and moving. Intentional physical activity, kinesthetic movement, and brain breaks increase engagement, provide necessary opportunities to refocus, and improve overall academic achievement and performance (Rashedi & Schonert-Reichl, 2019).

Traditional classroom environments and strategies do not align with the physically active needs and academic rigor of current kindergarten classrooms. The problem is that primary classrooms too often resort to the traditional instructional strategies instead of incorporating a classroom with adequate kinesthetic movement, physical activity, and brain breaks that meet the needs of young learners. The purpose of this literature review is to examine the impact that an increase in multisensory kinesthetic movement, brain breaks, and physical activity has on

learning in kindergarten classrooms. The research question that guides this literature review is: how does an increase in multisensory kinesthetic movement, brain breaks, and physical activity promote and impact learning within the kindergarten classroom?

Many researchers have investigated the academic, physical, motivational, and inclusive benefits of incorporating additional physical activity within the classroom setting. Studies have been conducted to examine the most beneficial type, advantageous method, and effective means of classroom movement to promote academic achievement most productively. Many action research studies included in this literature review conclude that movement in the classroom is advantageous and valuable. Increasing movement in the classroom encourages students to retain academic content at a higher level while increasing the ability to learn new concepts more easily (Benes et al., 2016). Young learners crave a learning environment that matches their innate desire to move while mastering the rigorous material intended for early learning.

The literature review reveals that students are more engaged, motivated, and perform better academically when intentional movement and brain breaks are strategically incorporated into the learning environment. This literature review provides a combination of research studies and data that promotes best practices to enhance teaching techniques that incorporate physical activity and specifically selected brain breaks into daily learning.

Peer reviewed research articles were examined and reviewed utilizing the following criteria: movement, kindergarten classrooms, physical activity, academic achievement, increased motivation, rigorous learning, brain breaks. Peer reviewed journal articles within the last 10 years were reviewed and included in this literature review utilizing the Northwestern College DeWitt Library online resource. Various themes were examined such as the impact physical activity has on learning, the perceptions of physical activity, and the effect instructional strategies such as

multisensory kinesthetic movement and brain breaks have on primary learning. Research will be structured in topical sections. The literature review sections will present research on physical activity, perceptions of physical activity, the most effective methods of incorporating physical activity, brain breaks, and multisensory kinesthetic movement.

Review of the Literature

Physical Activity for Students with Disabilities

In a quantitative study by Sempere-Tortosa et al. (2020), 64 elementary students were observed to quantify the amount of movement that children naturally perform in a learning environment. Using a Kinect device, movements were tracked and mapped to monitor the need for physical movement for students with and without an ADHD diagnosis (Sempere-Tortosa et al., 2020). According to the findings, medicated children who have an ADHD diagnosis showed significantly less movement than the non-medicated ADHD students. In other words, the children who received medication to improve their impulsive control demonstrated more restraint in physical movements. Additionally, girls with ADHD presented significantly more movement than boys with ADHD (Sempere-Tortosa et al., 2020).

Accurately identifying and addressing students' needs is vital to academic success. One of the tough challenges for researchers in this domain is ensuring an accurate diagnosis for such young learners. The quantitative study by Sempere-Tortosa et al. (2020) expressed that inaccurate ADHD diagnoses makes this topic extremely difficult to review with accuracy. Kindergarten students are at an early developmental stage with rapid growth and learning. Theoretically, it is possible for kindergarten students to be misdiagnosed or undiagnosed altogether. According to the research (Sempere-Tortosa et al., 2020), there have been students

misdiagnosed with ADHD that demonstrate hyperactivity yet do not have the disorder. To accommodate the misdiagnosed, undiagnosed, and those who may be diagnosed in the future, additional research is required to provide classroom movement and modifications that ensure a positive learning environment for all students.

The correct diagnosis and adequate classroom support benefit all unique learners. Similarly, as in the quantitative study on ADHD, the research of Miramontez and Schwartz (2016), investigates the impact that physical activity has on children on the ASD spectrum. The study focused on three male students in an inclusive kindergarten setting. Each of the participants were verbal and had an ASD diagnosis. In this study, the kindergarten class completed a selected brain break intervention prior to completing a writing activity. The participating teacher selected yoga, a dance party, or a story read aloud as the brain break prior to academic work, ensuring that the same activity was not selected on consecutive dates. The findings of this research (Miramontez & Schwartz, 2016) indicate that physical activity is an important part of the school day for all children, including those with ASD. Miramontez and Schwartz (2016) concluded that students with ASD were more on-task following yoga or dance parties which are more effortful activities as compared to listening to a story which is a sedentary activity. Likewise, the study showed a greater correlation between more vigorous activities such as a dance party and on-task behavior in comparison to a self-regulating activity such as yoga (Miramontez & Schwartz, 2016).

Perceptions of Teachers, Students, and Parents

In a mixed-methods study by Benes et al. (2016), 15 female classroom teachers and two male classroom teachers, with an average of 11.3 years of classroom experience, participated in a research study to determine the teachers' perspectives regarding integrating movement into the

classroom and investigate the resources needed to adequately incorporate more movement.

According to this research (Benes et al., 2016), not all teachers utilized movement on a regular basis, yet all reported positive correlations between increased classroom movement and student achievement. The results were overwhelmingly positive in favor of increased classroom movement as engagement increased, retention of learning material was improved, and it helped maximize the students' ability to focus on an academic task (Benes et al., 2016). As additional benefits, the teachers in this study (Benes et al., 2016) also reported a decrease in the prevalence of behaviors, fewer nerves and anxiety in students, and a more positive learning environment with less built-up energy.

The findings in this next study involving students and teachers (Miller & Lindt, 2018) echoed the results of the 2016 research (Benes et al.) with great similarities. In a 2018 study (Miller & Lindt), 76 students, four classroom teachers, and four preservice teachers participated in a study that quantitatively documented and evaluated student performance on academic materials and qualitatively described the observations and reflections of classroom and preservice teachers. Over the course of a two-week period, an experimental group was exposed to greater physical activity in reading and mathematics lessons (Miller & Lindt, 2018). The study (Miller & Lindt, 2018) showed that students correlated movement with content material yet did not necessarily retain information better because of increased physical activity when compared to the control group. The teachers reported an extremely positive correlation between additional movement and overall classroom learning. The findings indicate that movement promoted a more productive learning environment, benefited all types of learners, increased student engagement and motivation, and prompted students to participate in their learning (Miller &

Lindt, 2018). Lastly, the study (Miller & Lindt, 2018) reported less off-task behaviors with the teachers who purposefully incorporated more movement into the classroom learning.

Another research study by Gehris et al. (2015) describes extremely similar perspectives when determining how increased movement influences children's learning. In this 2015 study (Gehris et al.), 89 teachers were initially involved and eventually reduced to a focus group of 37 classroom teachers. This research (Gehris et al., 2015) reported a genuine awareness in classroom teachers that young learners possess an innate need to move. The teachers reported that intentional lesson plans were a critical component in connecting student movement with academic learning (Gehris et al., 2015). In addition to productive learning, this study reported that movement enriched academic concepts, focused children for learning, encouraged spatial awareness, promoted social skills and self-confidence, and utilized instructional strategies that tapped into the most natural methods of learning (Gehris et al., 2015).

As noted in the previous studies by Benes et al. (2016), Miller & Lindt (2018), and Gehris et al. (2015), teachers and students highlight the immensely positive aspects of increased physical activity within the classroom. Their perspectives appreciate the importance and acknowledge the benefits. Parents have a slightly different perspective on physical activity. In a study by Bentley et al. (2012), 32 parents of young children were interviewed to determine their knowledge of their child's physical activity levels. Through a series of in-depth, detailed phone interviews, the researchers reported that parents typically perceive their child to be active yet do not know how much exercise their child is getting (Bentley et al., 2012).

This information is pertinent to classroom learning as many parents felt the physical activity should come from the school setting (Bentley et al., 2012). Parents reported a desire to have more physically active children yet experience barriers that prevented that desire from

becoming a reality (Bentley et al., 2012). As our culture has changed to a more sedentary lifestyle and parents face barriers preventing children from organized movement opportunities, schools must consider their role in the physical activity levels of young learners. The previous 2016 (Benes et al.), 2018 (Miller & Lindt), and 2015 (Gehris et al.) studies emphasize the importance and benefits while the 2012 study (Bentley et al.) highlights the need.

Brain Breaks and the Effects on Learning

With increased academic rigor and raised expectations of young learners, research cautions teachers to ensure the inclusion of physical activity in learning as a means of adequate childhood development (Wadsworth et al., 2012). Brain breaks are instructional strategies that promote developmentally appropriate movement while understanding the learning stamina of young children. Brain breaks include fun songs promoting vigorous activity (Miramontez & Schwartz, 2016), yoga routines promoting mindfulness (Razza et al., 2015), or an intentional movement program promoting academic learning goals (Shoval et al., 2018).

In a study by Mavilidi, Drew, et al. (2020), 87 primary school students from three different classrooms were assigned a different brain break intervention. The interventions included: one class for brain breaks only that were separated from mathematical learning, one class for brain breaks and mathematics combined, and one class with controlled conditions involving mathematics only (Mavilidi, Drew, et al., 2020). This research (Mavilidi, Drew, et al., 2020) concluded that brain breaks significantly improve on-task behavior and academic achievement in children. Interestingly, the findings of this 2020 study (Mavilidi, Drew, et al.) indicate that the brain breaks with strictly physical activity were more beneficial in terms of academic achievement than brain breaks intermingled with academic content.

Conversely, a study by Shoval et al. (2018) involving 160 kindergarteners discovered contradictory findings. The 2018 study (Shoval et al.) investigated whether mindful movement, an intervention that integrates academics into brain breaks, or movement for its own sake, an intervention that allows children to move freely without academic instruction, was a more beneficial program. This study (Shoval et al., 2018) reported that mindful movement, the intervention which integrated academics into the brain break, showed most significant gains as children were purposefully involved in mind-on learning and movement. The research suggests that mindful movement has the potential to increase the quality of a child's overall cognitive performance (Shoval et al., 2018). Although mindful movement proved superior, movement for its own sake showed greater results than the control kindergarten class that did not implement a brain break intervention (Shoval et al., 2018). In other words, movement brain breaks of any kind benefit learners, however, integrating academics may have more significant benefits.

The research performed by Wadsworth et al. (2012) presents a different comparison that is pertinent for the teachers of young learners. Wadsworth et al. (2012) investigated the benefits of intentional physical activity breaks in comparison to free play opportunities. The research included two childcare centers that adjusted the amount of intentional physical activity breaks and free play time allotted for each day (Wadsworth et al., 2012). The findings (Wadsworth et al., 2012) indicate that the intentional physical activity breaks carried greater benefits than the free play as children were more engaged and prepared to continue learning. In other words, the breaks did not interrupt the learning, but rather helped students transition between activities and prepare for additional learning to ensue.

Yet another comparison for brain breaks is evaluated in the study by Magdalena et al. (2020) investigating the influence physical brain breaks have on student attitude towards physical

activity. This study (Magdalena et al., 2020) included 3,036 elementary students from eight different countries. After completing the intervention, the findings indicate that regular physically active brain breaks positively impacted student attitudes towards physical activities and improved learning, self-efficacy, and a desire to reach personal best goals (Magdalena et al., 2020). To summarize, brain breaks in elementary classrooms are positive, healthy, fun, and educationally beneficial.

A less vigorously intense, yet extremely effective type of brain break is the incorporation of yoga and mindfulness in the classroom. In the study by Razza et al. (2015), 34 children participated in a study that investigated the effect a yoga program can have on students when used as an intervention within the classroom. The findings of this research (Razza et al., 2015) indicate that the intervention group showed significantly higher focused attention, demonstrated less impulsivity, and increased executive functioning skills. This study by Razza et al. (2015) also indicates that mindful yoga is associated with greater inhibitory control and self-regulation skills. Mindful yoga, although less physically intense, provides equally beneficial qualities to classroom learning.

Similarly, a research study performed by Rashedi & Schonert-Reichl (2019), focused on the benefits of mindfulness when utilized as a classroom brain break for young students. The researchers acknowledged the importance of executive functioning in young children and how it impacts a child's control, working memory, and cognitive flexibility (Rashedi & Schonert-Reichl, 2019). In this study (Rashedi & Schonert-Reichl, 2019), researchers observed and evaluated progress for primary students as they completed yoga and mindfulness interventions. The findings indicate that the yoga and mindfulness brain break intervention promoted significant

gains on direct assessments of executive functioning, especially with students who demonstrated lower starting points (Rashedi & Schonert-Reichl, 2019). In other words, this yoga and mindfulness intervention most positively impacted the abilities of the lower, struggling students. The research also indicated that this intervention assisted students in developing greater social-competence, social-emotional development, a greater awareness of others, and overall better health (Rashedi & Schonert-Reichl, 2019).

Methods and Tools to Make Movement Efficient

Students spend a significant amount of time at school. Teachers have the ability to structure those hours to ensure developmentally appropriate activities are taking place and rigorous academic learning is occurring. A factor that teachers can control is ensuring the classroom environment is conducive to learning. In a study by McLaren et al. (2012), 20 kindergarten students participated in an investigation of the design of an inclusive kindergarten classroom. The research (McLaren et al., 2012) monitored the classroom setup and behaviors of children that indicated the most efficient methods of movement and most accessible areas of the classroom. The findings indicate that students were drawn to open pathways, unobstructed spaces, and open areas to perform those most movements in those locations (McLaren et al., 2012). The study by McLaren et al. (2012) also indicated that children gravitated to social affordances and copied the behaviors they saw in other students. “Contemporary neuroscientific evidence makes it clear that it is crucial to facilitate children’s movement in schools” (McLaren et al., 2012, p. 22).

Similarly, a study by Killbourne et al. (2017) discusses the importance of an activity-permissible classroom with an evidence-based design most conducive to learning. Traditional classrooms typically structure desks in rows with little room for movement

(Killbourne et al., 2017). “The design supports a teacher-centered modality and drives a passive learning protocol” (Killbourne et al., 2017, p. 3). In this 2017 study (Killbourne et al.), 26 students participated in an investigation on a more modern classroom structure that promotes a more student-centered learning environment. Students are no longer completing traditional work and must have a classroom designed to enhance learning in modern times. The researchers identified a higher level of engagement using an evidence-based classroom design in which students demonstrated greater focus, motivation, and received more feedback from the teacher (Killbourne et al., 2017). This study illustrates a model that shows how classroom designs and structures can provide learning opportunities and environments most conducive and supportive to all student learning (Killbourne et al., 2017).

Along with a beneficial learning environment, the methods in which students are instructed and evaluated impacts the learning. A study by Schmid et al. (2016), researchers evaluated the application of *En Plein*, a motion-based platform for teaching and assessing students in regard to phonological awareness skills. Within this study (Schmid et al., 2016), 16 children playfully interacted with the technological device and completed learning tasks while remaining physically active. To summarize, *En Plein* serves as an individual learning center that focuses intensively on phonological awareness skills while ensuring children are actively involved in the learning process. This study evaluated the effectiveness of such a platform. The researchers indicated that the program was highly enticing, engaging, and enhanced learning for students (Schmid et al., 2016). While both the control group and experimental group showed increased abilities, the experimental group increased 15.2% while the control group only increased 8.3% during the intervention period (Schmid et al., 2016). The researchers noted some

additional benefits of *En Plein* such as instant feedback and a playful, virtual environment that matches the learning styles of young children (Schmid et al., 2016).

Physical Activity Impacts Overall Wellbeing

The overall wellbeing of young children greatly impacts the academic capabilities demonstrated in the classroom. Higher-fit children in cardiorespiratory fitness have a greater amplitude and faster processing speeds than less fit peers (Mora-Gonzalez et al., 2019). A correlation exists between the working memory and physical activity of young children (Mora-Gonzalez et al., 2019). Obesity and health concerns are becoming a bigger factor with a more stagnant generation (Palmer et al., 2017). Integrating structured physical activity opportunities into classroom learning promotes the proper development of gross motor skills and developmental abilities (Palmer et al., 2017). Increased movement in the classroom addresses many of these concerns.

In a study by Mora-Gonzalez et al. (2019), 110 students participated in a study that strictly focused on the physical components of activity, such as muscular strength, speed, agility, and cardiorespiratory fitness, and the correlation to working memory and neuroelectric activity in children. The findings of this study (Mora-Gonzalez et al., 2019) indicate that cardiorespiratory fitness, speed, and agility were consistently associated with an improved working memory and neuroelectric activity. Promoting vigorous physical activity would not only benefit overall health and well-being, but also enhance working memory, especially with children who may struggle with overweight/obesity (Mora-Gonzalez et al., 2019).

As overall health and well-being is examined, food choice, nutrition, and screen time must be taken into consideration. A study by Snelling et al. (2015) examines how activity levels, food consumption patterns, and daily screen time correlate with successful grades in school.

1,034 students were involved in the study as students self-reported daily habits in each category (Snelling et al., 2015). The findings indicate a significant relationship between increased physical activity and academic performance and better food choices and academic performance (Snelling et al., 2015). Students receiving As and Bs were more physically active than those reporting lower grades (Snelling et al., 2015). Students spending less time watching television and playing video games reported receiving higher grades than those who recorded more screen time (Snelling et al., 2015). In other words, not only does staying physically active, eating healthy, and decreasing screen time promote overall health, but also correlates with better academic performances.

When considering the benefits of physical activity, the type of activity should also be evaluated. In a study by Palmer et al. (2017), 87 young learners participated in a study investigating the benefits of structured movement and movement in a more relaxed setting. To collect this data, students were monitored through Actical Accelerometers which are small devices that measure physical activity levels (Palmer et al., 2017). The findings (Palmer et al., 2017) indicate that the children who participated in the indoor, structured movement activities were lightly, moderately, and vigorously involved far greater than the opposite group. Conversely, the outside, free play group demonstrated far greater sedentary time in comparison to the structured movement group (Palmer et al., 2017). The researchers noted that the teachers had a great impact on the level of physical activity through their example, modeling, and instructional energy levels (Palmer et al., 2017).

Multisensory and Kinesthetic Learning

Children need adequate gross motor development and physical activity to learn and grow (Callcott et al., 2015). These motor skills and movement are enhanced with multisensory and

kinesthetic learning practices. Multisensory instruction lends itself well to the way young learners authentically learn and behave (Lozy et al., 2020). Physical activity has numerous positive impacts on overall cognitive function in young children (Mavilidi, Okely, et al., 2016). The improvements academically may be tied to the kinesthetic learning methods or to the added benefits that physical wellness plays in overall cognitive functioning (Cecchini & Carriedo, 2020).

According to a study by Labat et al. (2015), a multisensory approach with young learners drastically improves academic abilities, especially with early reading and writing skills. In the study, (Labat et al., 2015), 50 students received training sessions with different methods of instruction to identify and improve letter recognition and letter sound fluency abilities. The visual and kinesthetic groups were most effective at enhancing alphabetic principles for reading and spelling skills (Labat et al., 2015). The findings indicate that, based on brain imaging, the kinesthetic movement performed on each shape promoted a greater level of mastery (Labat et al., 2015).

Similarly, a study by Callcott et al. (2015) investigated two literacy intervention programs called “Let’s Decode”, which focuses on literacy, and “Moving on with Literacy”, which focuses on movement and literacy. This research by Callcott et al. (2015) studied the progress of 400 kindergarten students within these interventions over the course of an entire school year. The findings (Callcott et al., 2015) indicate that the intervention entitled “Moving on with Literacy” was the only group to perform better than the control group and that physical activity is connected to cognitive performance. The researchers indicate that there may be a synergistic relationship between the areas of the brain involved in literacy and movement (Callcott et al., 2015).

In agreement, another kinesthetic literacy research study by Lozy et al. (2020) investigated the effects of pairing kinesthetic movement with the acquisition of literacy skills. In this study (Lozy et al., 2020), six children used mnemonic devices and kinesthetic movements to demonstrate literacy skills. The findings (Lozy et al., 2020) indicate that using kinesthetic movements correlated with children requiring fewer intervention sessions to master the skill. In other words, all children learned the skills, but the paired kinesthetic learning assisted the students in mastering the skill at a faster rate. The research mentioned how kinesthetic movements provide classroom teachers with low-cost and effective methods of improving academic abilities (Lozy et al., 2020).

Multisensory mathematical interventions indicated similar results. In a study by Cecchini & Carriedo (2020), researchers investigated the effects of an interdisciplinary approach integrating mathematics and physical education. 46 students participated in the study by Cecchini & Carriedo (2020) that examined the educational differences between a traditional math intervention and one infused with kinesthetic, active learning. The findings indicate that all interventions showed growth in mathematical abilities, however, the combined approach showed more significant growth than the traditional method (Cecchini & Carriedo, 2020). The researchers determined there is a significant correlation between movement and increased physical activity with better cognitive development and mathematical abilities (Cecchini & Carriedo, 2020).

Similarly, the benefits of kinesthetic learning improve geography skills in young learners. In a study by Mavilidi, Okely, et al. (2016), 90 students were included in one of three geography intervention lessons: the integrated group that required students to act as animals from each continent, a nonintegrated group that required students to run vigorously to locations on the map,

or the control group that learned without physical activity. The first finding indicates that students who were physically active demonstrated increased enjoyment and engagement (Mavilidi, Okely, et al., 2016). The other finding indicates that the integrated group demonstrated the best results but were not significantly greater than the nonintegrated group (Mavilidi, Okely, et al., 2016).

Physical Activity and Academic Achievement

Recent studies indicate there is an important connection between physical activity and other neurological components of the brain (Tilp et al., 2020). Not only does physical activity improve cognitive function, but also increases academic performance (Golsteyn et al., 2020). This information equips teachers with knowledge to purposefully integrate movement into learning. It is critical this increase in physical activity begins in kindergarten. There is a positive correlation between gross motor abilities and high cognitive capabilities in addition to proper growth and development (de Waal, 2019). One major component of early academic success is refined executive functioning abilities. Executive functioning is a portion of the brain that directly benefits from exercise (Chang et al., 2013). Beginning healthy physical habits that translate into learning success at a young age is vital for future achievement (Käll et al., 2014).

Executive functioning is a part of the brain enhanced by exercise (Chang et al., 2013). Therefore, early exercise would promote an early development of productive executive functioning skills that would significantly improve a young child's cognitive development. A study by Chang et al. (2013) investigates the long-term benefits exercise can have on 26 healthy kindergarten students. This research was conducted using soccer as the activity in 35-minute sessions, twice per week, for eight weeks (Chang et al., 2013). Of the three groups, the children in the moderate-intensity group demonstrated improved fitness, muscle endurance, flexibility,

and body composition in comparison to the low-intensity group (Chang et al., 2013). However, the high-intensity group showed the most significant improvements in all categories (Chang et al., 2013). In this study (Chang et al., 2013), the findings support the positive impact coordinative exercise, such as soccer, has on executive function in kindergarten children.

In a mixed-methods study by Käll et al. (2014), students from local sports clubs and elementary schools participated in physically active interventions to determine the impact movement had on academic achievement. The findings of this study (Käll et al., 2014) indicate that the more physical activity a child was involved in, the more the child's academic achievement improved. The research indicated that the physical activity interventions led to greater concentration abilities for students and more positive classroom behaviors which also led to greater academic achievement (Käll et al., 2014).

The research by Käll et al. (2014) was related to clubs and elementary school while this 2020 study (Tilp et al.) focuses on a morning break during the school day. 35 children participated in a physically active intervention program during the morning break of the school day over the course of five weeks. The researchers indicate an increase in attention, concentration, fluency, and arithmetic in comparison to the control group (Tilp et al., 2020). This study by Tilp et al. (2020) adds evidence that exercise correlates to gains involving attentional performance and academic achievement. The findings also indicate that a motor-coordinative intervention is associated with an increase in creative potential (Tilp et al., 2020).

After rigorous days of learning, many children spend a significant amount of time in afterschool programs in the evening hours (Riiser et al., 2019). This study by Riiser et al. (2019) investigates how intentionally increasing minutes of physical activity impacts the children involved. The findings indicate that, on average, children in afterschool programs complete

nearly half the recommended amount of vigorous activity (Riiser et al., 2019). With the knowledge that children are far too sedentary and spending a significant amount of time at afterschool programs, schools should look to utilize the opportunity and improve students' strength, coordination, balance, and agility through physical activity within the program (Riiser et al., 2019).

Vetter et al. (2020) exposed a lack of numeracy skills in recent years and devised a mixed-methods study to investigate the correlation between physical activity and fitness levels and math scores. The study (Vetter et al., 2020) identifies that 6/11 of the intervention groups showed significant improvements in math scores. The research accompanied a disclosure that age and content area appear to make difference with the results of the movement intervention (Vetter et al., 2020). To summarize the literature, kindergarten is an ideal age to begin physical activity interventions to ensure the cognitive potential is at a maximum.

Similarly, promoting early physical activity interventions, is the study by de Waal (2019) focusing on fundamental movement skills and academic performance for primary students. In this study (de Waal, 2019), 69 kindergarten students participated in this assessment for physical and intellectual competence. The researcher indicates that moderate to large correlations exist between fundamental movement skills and academic skills (de Waal, 2019). The study highlighted relationships between reading and locomotor skill as well as mathematics and object control skills for young learners with disabilities (de Waal, 2019).

Lastly, a study by Golsteyn et al. (2020) investigates the correlation between physical activity in a student's life and the levels of academic performance of students. In this study (Golsteyn et al., 2020), students in 21 schools participated in a physically active intervention over the course of two school years. Unlike much of the other research, the findings of this study

(Golsteyn et al., 2020) indicate that increasing physical activity does not directly contribute to increased academic performance. In this particular research, Golsteyn et al. (2020) hypothesize the contrary results are due to students stopping academic work to be active or a need for a specific physical intervention to be utilized.

Conclusion

As kindergarten expectations and academic rigor increase, the correct use of movement in the classroom and current instructional strategies create a learning environment conducive to academic growth. Classroom movement is vital in addressing the initial problem of stagnant learning and teacher-centered classrooms. Utilizing movement creates an inclusive environment that accommodates every learner, increases attentional focus, and promotes on-task behaviors (Miramontez & Schwartz, 2016). With a highly intensified learning environment, young students benefit greatly from brain break opportunities. These brain breaks enhance self-regulation skills, working memory abilities, and cognitive flexibility (Rashedi & Schonert-Reichl, 2019). Naturally, physically active children crave movement and are drawn to opportunities to move. There is a significant relationship between increased physical activity and increased academic performance (Snelling et al., 2015). One area of recommended future research would focus on the impact of movement in a kindergarten classroom as a proactive instructional strategy for undiagnosed or misdiagnosed kindergarten students. Another area of recommended future research would examine the correlation between increased classroom movement and stamina for learning. Instructional strategies implemented by classroom teachers must reflect the research studies described in this literature review to enhance learning opportunities for young learners and ensure academic achievement.

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