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Middle School Teachers' Perceptions of Brain-Based Learning and the Implementation of Physical Brain Breaks as a Classroom Management Strategy

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MIDDLE SCHOOL TEACHERS' PERCEPTIONS OF BRAIN-BASED LEARNING AND THE IMPLEMENTATION OF PHYSICAL BRAIN BREAKS AS A CLASSROOM MANAGEMENT STRATEGY

By
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Approval Page

This dissertation was submitted by Tiffany C. Neal under the direction of the persons listed below. It was submitted to the Gardner-Webb University College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Gardner-Webb University.

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Abstract

MIDDLE SCHOOL TEACHERS' PERCEPTIONS OF BRAIN-BASED LEARNING AND THE IMPLEMENTATION OF PHYSICAL BRAIN BREAKS AS A CLASSROOM MANAGEMENT STRATEGY. Neal, Tiffany C., 2022: Dissertation, Gardner-Webb University.

The purpose of this study was to better understand educators' perspectives of physical brain breaks at middle schools located in the northwestern part of North Carolina as it relates to the brain-based learning theory. This study is important because it helps to bridge the gap between the educational and neuroscience fields by providing teachers' perspectives about using physical brain breaks, issues implementing them, and the importance of relationships with educational stakeholders. After submitting the survey, participants were asked to share their contact information to show their willingness to participate in a focus group with their peers to answer 10 questions about their experiences with physical brain breaks or the lack thereof. The data from the survey were analyzed for themes and common responses supplied by the participants. Data from the survey showed a minority of the participants give a physical brain break, while most do not and do not have a desire to learn more about them. Data from the focus group were analyzed by having the recorded conversation transcribed and then looking for repeating words and phrases. Themes such as time, classroom management, and relationships were discovered in the analysis, with the most emphasis on the importance of relationships. The implications of this study include time, space, and the willingness of teachers to implement a strategy for which they have not received professional development for successful implementation.

Keywords: physical brain breaks, brain-based learning, physical activity, classroom management, student behavior, perceptions

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Chapter 1: Introduction

Students at middle schools in the northwestern part of North Carolina are expected to learn for almost 375 minutes per day, and most of the learning takes place in a seated position. According to the World Health Organization 2020 guidelines for physical activity and sedentary behavior, students should not remain in seated positions for extended periods, especially when completing assignments using an electronic device (Bull et al., 2020). Remaining sedentary for a long time may cause health issues such as high blood pressure, obesity, and depression (Chang & Coward, 2015). Educators are contributing to the growing health problems of their students by having them remain in seated positions for much of the day. While educators may be contributing to sedentary lifestyles, they may also be dealing with the unfavorable reactions of having students learn from a seat. Sitting in classrooms for lengthy periods without movement may increase obesity in students. Other issues associated with remaining in a seated position may be a decrease in blood circulation, a decrease in cognitive functions, and boredom.

The inability to move in a classroom may contribute to undesirable behaviors such as bullying. Many teachers feel they have the responsibility of educating the whole child but are not doing so because the brain is not being considered as educators instruct on their prescribed content. Students struggling academically may not necessarily need additional classroom time but instead physical activity (Rosenkranz et al., 2020). A teacher using brain-based teaching methods could combat students struggling academically by incorporating physical brain breaks into their classroom routine. A student's mind may not be able to receive the latest information when they have plaguing issues like indigestion fatigue and gas, coupled with the attitude of being a developing

adolescent. Students at the middle school level are experiencing new levels of hormones causing some students to behave in abnormal ways. When you group developing hormones, spending much of the day on electronic devices, and sitting in a class for 8 hours, students are headed for academic disaster. Allowing students the chance for movement in the classroom may help to minimize potential health issues. Not only can physical movement help to improve student health but there appear to be benefits in the classroom also.

One's cognitive ability is influenced by outside factors, and this must be accepted by teachers to engage students in the classroom (Souers & Hall, 2016). When exercise is infused into the classroom, teachers are more likely to see students remembering more information and being eager to learn, and an increase in paying attention. Brain breaks are interactive experiences among students while providing teachers with a connective platform (Kuan et al., 2019). Students that are given the opportunity to partake in movement in the classroom, they are less likely to direct their energy to inappropriate behaviors. Small amounts of physical activity can help to improve students' learning experiences because with oxygen being supplied to the brain, it puts it in an optimal working state. Students experiencing boredom may participate in unacceptable behavior causing more classroom disruption, which could negatively impact the classroom. This could result in the loss of instructional time, bullying, or the complete disconnect of a student from the class.

Lately, researchers are becoming more interested in the relationship between exercise and the brain's cognitive functions because of the positive results seen from the data. Elderly dementia patients participating in physical activity tend to have positive

brain functions such as memory and length of concentration. While these findings may suggest some type of positive correlation between dementia patients and movement, more research is needed to determine if middle school students taking physical brain breaks will yield benefits in the middle school classroom.

While kinesthetic learning research has been investigated and shows students learn more when their bodies are in motion, there has not been as much research completed to examine the benefits of movement while taking a break from learning. Physical brain breaks are quick 30- to 90-second activities to help students refocus and hopefully reenergize (Sladkey, 2013). In a school district in the northwestern part of North Carolina, teachers could implement the best learning practices for their students. Implementing physical brain breaks in the classroom may help teachers minimize inappropriate behaviors, while students' brains may get the oxygen, they need to contribute to student success.

Statement of the Problem

Some middle school students sit in a classroom for 85 minutes three times a day for language arts, math, and social studies, while being in elective classes, such as physical education, Bible, technology, or Spanish, for the remainder. While in class, students focus on the information being presented without being disrupted or creating a disruption to appropriately attain the content. Research has shown students need more physical activities to combat classroom issues such as inattentiveness and a decrease in test scores. Research suggests more studies are needed to better understand the use of physical activity in the classroom to enhance the brain's functionality. Teachers have and continue to receive training on teaching methodology without an emphasis on the brain's

function. Teachers are constantly looking for the best practices to implement in their classes without leadership or direction from the district.

This study examined how middle school teachers in a district in the northwestern part of the state perceived the implementation of physical brain breaks as a classroom management strategy while considering the brain-based learning theory. Following the study, neuroscientists, teachers, and other stakeholders will be more knowledgeable about physical brain breaks and understand some teachers' perceptions and their willingness to take the time to implement this practice. Teachers instruct content to students with the hope that they will show proficiency when being assessed at the state and local levels. The problem plaguing teachers is ways to keep the students engaged with minimal classroom disruption; for some teachers, 90 minutes just is not enough time to cover the material prescribed by the district's pacing guide. During class, students are expected to stay seated at their desks, be attentive, and indulge in opportunities to show their understanding of the material being taught by the teacher. During these class periods, there are minimal times for students to get out of their seats, except for the bathroom and possible collaborative learning activities. Some teachers also discourage movement in a class by offering students incentives to not take bathroom breaks and asking students to reserve those for class change. Many teachers elect to plow through the daily agenda without a brain break or a moment for students to put their attention elsewhere because they have found this method to be effective and this might be how they learned. Individuals fully engaged in updated content have a window of 20 minutes before they are no longer able to focus.

When physical activity is not offered at school, students often do not seek

physical opportunities for play or exploration. Students are constantly sitting from the time they get up in the morning until they return to bed at night. The Centers for Disease Control and Prevention (CDC), American Heart Association, and the World Health Organization suggests students in grades kindergarten to twelfth participate in some type of movement considered to be moderate to vigorous every day (Cline et al., 2021; Mok et al., 2020; Stylianou et al., 2016).

Students at a school in the northwestern part of North Carolina take physical education half of the school year, and they only participate in movement for 35 minutes. Students sit at the breakfast table and desk at school, and now a lot are posted in a gaming chair for hours of entertainment on their gaming devices. Students are not given ample opportunities in school to partake in physical brain breaks, which has the potential of the loss of attention in the educational setting, possible undesired behaviors, and the onset of various health issues. Recent research shows movement is encouraged as a practice to help the brain's function (Geertsen et al., 2016); however, some teachers feel there is often little support, training, or understanding they need to be given for the implementation of physical activities. To help teachers become more effective in incorporating physical brain breaks, they may need professional development and support from their principal (Jørgensen et al., 2019). Teachers are constantly researching the best practices to ensure students are exposed to optimal learning experiences. Unfortunately, teachers may find it hard to find motivational reasoning for implementing movement in their classrooms (Knudsen et al., 2021). Numerous obstacles such as the lack of resources, time and professional development may be the underlining factors for lack of physical activity seen in the modern classroom. The educational field continues to serve

as an origin of inspiration for research concerning neuroscience (Sigman et al., 2014). Unfortunately, the gap between the classroom and the laboratory prohibits further understanding of teachers' understanding of how the brain is used effectively in the classroom. The gap between neuroscience and education needs to be closed, but there is little knowledge about how teachers feel about implementing physical brain breaks as they teach (Knudsen et al., 2021). Research on how educators use physical brain breaks is needed to better understand the similarities among the teachers who do use them (Webster et al., 2015). Physical brain breaks could help students with the time needed to direct their attention elsewhere to improve their brain's functionality when they are focused on the content being covered by their teacher.

Middle Grades Scheduling

A middle school's master schedule is based on the three grade levels in the school, accessibility to teachers, and the time required for students to be in school. The class time corresponds with the accessibility of teachers, the prescribed course of study, and the requirements established at the state level. Principals at the middle school level in the school district in the northwestern part of the state can schedule class times as they see best for their student population and availability of staff. Core class teachers, consisting of science, social studies, language arts, and math, have their students for 85 minutes a day. Elective classes consisting of art, Spanish, keyboarding, band, physical education, science technology engineering and mathematics, and chorus instruct 45 minutes a day unless the schedule has been compromised. To help students who need more attention on the major standards being assessed on the end-of-grade (EOG) tests, there is an extra 30 minutes added to the schedule, while students do not need the extra

help to participate in enrichment activities. Halfway through the school year, students start new classes with their elective teachers. Sixth- and seventh-grade science and social studies teachers also have their students for 1 semester with the expectation of a yearlong course being taught.

For some teachers, adding one more element to their daily routine may seem problematic because they may feel they need their scheduled time just to focus on academics. Classroom disruption and attempts at refocus may take instructional time from teachers, but physical brain breaks can be used to curtail these issues while adding to the brain's functionality. In 2016, the North Carolina State Board of Education implemented the Healthy Active Children Policy to help students overcome nonacademic barriers to be successful individuals. Physical activity is a component Local Education Agents are required to provide. In turn, teachers may see an enhanced performance in their students' engagement levels. A quick physical brain break may take 30 seconds, but the benefits may last the entire year. In addition to the master schedule, there are alternative schedules prepared for early release and delayed start days. Physical activity has proven to have positive effects on student health and academic performance, but challenges including time and training prevent successful implementation (Jacobsen et al., 2017). The schedules are also used during testing to preserve valuable instructional time. Studies suggest extra time given in school is not likely to hurt student performance (Mullender-Wijnsmaet al., 2015).

Student Behavior Expectations

An ideal middle school student would enter the school building at the correct door and then hold the door for the next person coming. After arriving at the classroom, they

would go directly to their assigned area with all supplies and a willingness to try, regardless of how many times they may have to try before being successful in the content being studied. This ideal student would not join in with students participating in inappropriate behaviors. Schools displaying and modeling elevated expectations for their students are an arena for positive student behavior. Unfortunately, a small portion of students can create enough turmoil to ruin any teacher's attempt at delivering sound instruction. Negative behavior often has an undesirable impact on the classroom if it is not dealt with appropriately. Positive behavior intervention services can be used to help encourage positive behaviors and minimize negative behaviors. Within the first week of school, teachers, school staff, and administrators must be intentional about the school routines, structure, and disciplinary procedures. Schools being proactive like to focus more on positive behaviors of students to encourage others to follow suit and to reward those who make the best choices about behaving appropriately. At the middle school level, there is increased peer pressure, and educational leaders hope to see peer pressure applied for positive outcomes. Student achievement will not increase with negative behavior because when the student disregards instruction, it could cause them to fall behind in classwork.

A school district located in a rural area in the northwestern part of North Carolina uses Positive Behavior Intervention Systems (PBIS) to promote favorable student behavior and to reward those for behaving correctly. Classroom teachers are expected to have the matrix posted in their classrooms for students to see and adhere to. At the beginning of the school year, teachers are expected to provide instruction about the expectations. At the end of morning announcements, the motto is shared with the school

to remind students of what is expected of them daily at school.

When students present inappropriate behaviors in the classroom, teachers are expected to follow steps to recognize, prevent, and redirect them. Parent phone calls, silent lunch, student conferencing, seating, and isolation are ways teachers can handle inappropriate behavior in the classroom. If the inappropriate behavior continues, teachers may need to send the student to another classroom for the day, ask parents to come in for a parent conference, or refer the student to administration for discipline. Some teachers prefer to handle inappropriate behaviors to prevent a rift in the relationship they have with a student, and it also sets the precedence with other students to curtail negative behaviors in the classroom.

Physical activity can improve students' classroom behavior while also being helpful to students' ability to perform on standardized tests, and this can improve students' attentiveness in class. Disruptive behavior in the classroom can be limited when a physical brain break is offered (Camahalan & Ipock, 2014). Students who exemplify positive behavior may be rewarded with extracurricular activity opportunities. The middle school provides the opportunity for extracurricular activities, including sports, student government, and special interest clubs. While some students know how to prioritize extracurricular activities, others make it a priority in their daily routines. This provides more reason for teachers to offer physical brain breaks in class as students are stressed by so many other factors.

Classroom Management

Managing student behaviors can prove to be one of the hardest tasks teachers take on, as there are unlimited factors to consider when establishing procedures, expectations,

and routines. Off-task behaviors cause a severe detriment to valuable time for content coverage, and it is a problem educators try to minimize daily (Godwin, 2016). Teachers have so much to consider when preparing strategies to keep the classroom safe, orderly, and ideal for learning. Seating charts may be used to help teachers learn student names to minimize inappropriate behaviors or to help students collaborate. Established routines lead to enhanced classroom management, enabling the teacher to provide a structured atmosphere to minimize difficulties students may have while in a social setting (Wilson & Conyers, 2016). Once teachers have established the structure and procedures they desire, students may be able to take ownership of some decisions concerning the learning atmosphere. Teachers incorporate school norms into the classroom expectations to help students transition from class to class. Some teachers believe in building relationships to help students find success in their classes, while others take a more dictatorship approach to get students to abide by their classroom procedures. While some teachers prefer an orderly classroom, others may like organized chaos; however, most teachers implement the best practices to serve their student population. Classrooms deemed successful have established routines and the teacher has created a transparent understanding of the acceptable way students are to conduct themselves.

A PBIS is used at the school to promote positive behavior instead of entertaining negative behavior. In the classroom, students are expected to be willing to behave correctly by focusing on learning, remaining positive, keeping their voices off, and not disrupting the class. They are expected to be ready to remain respectful, use appropriate language, and keep their belongings to themselves. Motivational practices in the classroom include keeping the classroom clean, while successful students come to class

prepared and ready to do the work assigned by their teacher and at least listen while following directions. Other school-wide classroom expectations include teachers signing student planners if they need to leave the class period. The planner has a spot to notate the date, time, and student's destination. Students are rewarded at the end of the grading period for good behavior, academic achievement, and embodying good behavior through grade-level pizza parties, days at the park, and blue tickets for free entrance to sporting events. The PBIS model helps to eliminate guesswork for teachers when trying to develop classroom expectations and gives students fewer transitional issues if they were to transfer schools within the district. Teacher beliefs help them to determine the processes they may apply when determining ways to manage their students. A teacher's belief system may inform their classroom practice, and for some, they may unknowingly impact their students because they are not familiar with their own beliefs toward diverse students. To help teachers streamline their personal preferences about expectations and routines, they can couple PBIS with their routines to produce positive outcomes. Students not engaged in the outcome of their academic performance may experience poor outcomes (Owen, 2018). Teachers may experience a reduction in unacceptable behaviors with scheduled physical activities as opposed to not receiving brain breaks at all. In addition to the rules and procedures, physical brain breaks may serve as another classroom management strategy to improve students' abilities to stay on task and to find success in a classroom. Teachers are often bombarded with the district's ideas of best practices and pilot studies sometimes interfering with teachers' desires to find new and innovative ways to improve instruction. Teachers may not feel as if they have enough training to implement a new approach to education, resulting in a reluctance to participate

in research-based practices (Reinke et al., 2011). In some cases, teachers may not be able to provide the student with the opportunity to have their needs met. Some students may act out because they feel their needs are not being met, whether it be physical or social. Teachers may not always see the fruits of their labor immediately, but students often take their experiences well beyond the classroom when they are in a safe and structured learning environment. An important part of the instruction given by the teacher is intended to motivate and instruct to develop intelligence (Wilson et al., 2016).

These are elements teachers hope will surface beyond the classroom. When teachers implemented classroom physical brain breaks to help with inappropriate behaviors, teachers reported classroom management was a major factor in preventing the implementation of physical brain breaks (McMullen et al., 2014; Stylianou et al., 2016).

Purpose of the Study

The purpose of this qualitative study was to better understand teachers' perceptions of the benefits and challenges of implementing physical brain breaks in middle school classrooms. Research on how educators use physical brain breaks is needed to better understand the similarities among the teachers who do implement them (Webster et al., 2015). President George W. Bush designated 1990-2000 as the decade of the brain due to an increased effort to bring public awareness to the potential benefits of brain research. While the neurological field will not be able to remedy all classroom management issues, the collaboration between education and neurology may serve to bring about changes in how teachers provide instruction with more emphasis placed on the brain's functionality (Zadina, 2015). Studies to learn ways in which educators can implement physical activity into classroom procedures and expectations are necessary to

foster ways to enhance learning opportunities for students (Bedard et al., 2019). After providing middle school students the option to share their opinions about physical activity, they reported they felt they needed more chances during to the day to participate in movement daily (Booth & Gerard, 2011). Classroom teachers can remedy the need and desire for students to experience more movement by having students participate in physical activity for 60 seconds or less. The CDC (2021) recommended kids and teens get at least one hour of physical activity every day.

The purpose of this study was to better understand teachers' perspectives of physical brain breaks in a middle school located in the northwestern part of North Carolina. There has been little qualitative research completed to better understand the support given by other teachers, the district, and administrators concerning giving funding, time, and training for classroom movement (Dinkel et al., 2017). To promote the use of classroom physical activity by teachers not currently doing it, an understanding needs to be developed from other teachers participating in the practice (Webster et al., 2015). The education population may have a better understanding of the importance of incorporating physical brain breaks into the classroom and how brain-based learning can guide educators as they prepare to instruct the content. By doing so, it is expected students will be more attentive in class, retain more information, and refrain from inappropriate behaviors causing disturbance to others. There is a need for more research on the brain-based learning theory as it relates to classroom movement and how teachers and students participating in physical brain breaks could be taking a step towards a healthier brain.

Participation in physical activity is associated with multiple cognitive, academic,

behavioral, and health benefits, all of which are important aspects of growth and development throughout adolescence (Stylianou et al., 2016). Physical activity coupled with the knowledge of brain functions may help educators become more effective when planning educational opportunities. The benefits of regular physical activity include weight management, improved sleep quality, lower blood pressure, stronger bones and muscles, increased heart and brain health, improved balance and coordination, and a decreased risk of developing certain types of cancer. Movement is needed for optimal learning because the brain is a complicated organ that drives the entire body. Physical activity in the classroom has proven to be an effective practice, and numerous teachers participate in it with little to no professional development (Dunn et. al, 2012). Programs such as Brain Gym and YouTube provide teachers with an unlimited platform for physical brain break ideas.

Some teachers have taken the time to create their physical brain breaks based on their students and their research practices. Participating educators implementing brain breaks during Baker et al.'s (2017) study noted they understood the connection between physical activity and improved academics. Teachers often consider content over brain functions when preparing to instruct their students, and this may be a barrier for teachers considering implementing physical brain breaks into a middle school class. Areas for the educational and neurological fields to consider would be curriculum to encompass the brain's function while also acquiring a better understanding of how student's brains work at different developmental stages. Content delivery and retention are often prioritized without considering the organ which makes it possible to store, comprehend and apply the information being taught daily. Previous studies have resulted in the increase of

students' abilities when their teachers have prior understanding of educational neurology through professional training opportunities, differentiated curriculum and changing classroom management practices (Zadina, 2015). Numerous factors are to be considered before a teacher implements a new practice, including time, knowledge, class size, and administrator approval. This study examined teachers' perspectives on the implementation of physical brain breaks in core classes.

Research Questions

1. What are middle school teachers' perceptions of brain-based learning, and how do these perceptions impact classroom management strategies?
2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom?
3. What themes exist among middle school teachers concerning physical brain breaks?

Significance of the Study

Childhood health issues, such as obesity and diabetes, are plaguing students all over the world due to sedentary behaviors. Preservice teachers in Finland completed a study, and they believed incorporating physical activity in class is doable and planned to use physical movement to improve instructional practices (Lee et al., 2021). Opportunities for in-class movement have been known to improve students' brain functionality which in turned teachers observed positive changes in motor development, physical fitness, cognition, attention, learning, academic achievement, and mental health (Mok et al., 2020). The research questions addressed in the study can help the educational

community better understand in what ways classroom teachers can contribute to optimizing student learning while helping to improve students' overall health. More so than ever, people spend more time looking at a screen, whether it be on a laptop, tablet, or television. Students enjoy being able to participate in movement while in class (Martin & Murtagh, 2015; McMullen et al., 2014; Stylianou et al., 2016).

Following the COVID-19 pandemic, more schools have students complete work using electronic devices in case there comes another point in the future when students would have to return to virtual learning full-time. Students have become complacent sitting in front of devices with minimal movement to get their heart rate elevated, which in turn often leads to poor health and a lack of interest in areas outside of entertainment.

Public school systems often try to remedy the ills of society by building relationships within the community and external organizations and implementing best practices discovered through continual research. Current legislation such as the No Child Left behind Act of 2001 makes it hard for teachers to provide students with assorted opportunities for physical activity during class due to the overwhelming demand of displaying progress on standardized tests (Mok et al., 2020). Health issues among any age group can cripple the success of a society, and it is important for students to be allowed to move within the classroom to combat unhealthy habits which may lead to complications later in life.

Implementing physical brain breaks in the classroom may help teachers as they deal with ways to improve student success and prevent undesirable behaviors; however, this may benefit students far beyond the classroom. While brain breaks allow students to get up and move around, it also teaches them the ability to stop a task, take a break, and

then return to refocus on the assignment they have been given. This is an ability they will need throughout their life to be successful, whether in a professional or personal setting.

Physical brain breaks are responsible for a range of healthy rewards which encompasses the body's ability to keep a healthy body weight, the reduction of anxiety and depression, and the ability to assimilate into society successfully (Bull et al., 2020). Adding a physical component to a break will only serve to maximize the potential energy needed to complete the assigned task. Physical activity brain breaks may help students' focusing ability to improve while providing students a bout of physical activity (Perera et al., 2015). Physical brain breaks not only help students but teachers as well because everyone's brain has the potential to benefit from movement.

Negative behaviors started to decrease with the implementation of physical brain breaks (Baker et al., 2017). As Dinkel et al. (2017) pointed out, "Schools can serve as prime opportunities to improve children's PA because the vast majority of children attend (97%) and spend a large amount of time in schools, 6 or more hours/day, 180 days/year" (p. 187). The amount of time students spent at school provides an optimal time to improve physical activity opportunities. Implementing physical brain breaks does not have to take a significant amount of time because the smallest amount of movement can reap benefits. Interventions endorsed by administrators help teachers during the implementation process. Lawmakers, school board members, and building managers may benefit from collaborating with teachers before instituting new initiatives (Erwin et al., 2011). Not all teachers will be willing to implement physical brain breaks without the necessary training and proven research to support their benefits. Physical brain breaks may be used in classes to stimulate the brain's natural learning processes. Once teachers

understand the relationship between movement and brain functions, they may be more willing to examine ways to incorporate physical brain breaks in the class. Brain-based learning has proven to be beneficial in improving student achievement (Vyas & Vashishtha, 2013). The collaboration between the educational and neurological field has created a new interest in the possibilities associated with improving the learning atmosphere when students' brains are made a priority (Hohnen & Murphy, 2016). The educational setting remains fluid and should always be in motion for positive changes.

Research has suggested educators need to address motivational and learning issues from a brain-based framework (Hohnen & Murphy, 2016). This study serves as a step towards bridging the gap between the education and neuroscience fields as teachers' perceptions were explored to gain a better understanding of physical brain breaks in the classroom.

Methodology Overview

This qualitative study examined teacher perspectives on giving physical brain breaks in the classroom as it relates to the brain-based learning theory. Participants were teachers from four middle schools in a district in the northwestern part of North Carolina. Participants completed a 10-question survey about the frequency of giving physical brain breaks, types, barriers to incorporating them, and potential benefits. Some teachers agreed to participate in a focus group by agreeing to meet with me using Zoom to discuss questions about their perspectives of the brain-based learning theory, physical brain breaks, and the perceived rewards and consequences of using them. The focus group and collected surveys were analyzed through qualitative methodology.

Setting

The study was conducted in middle schools located in a rural school district in the northwestern part of North Carolina. Students received instruction in three core classes and two electives along with a 30-minute intervention and enrichment session. Students lived in rural cities in the northwestern part of the state, most of which are small rural towns with a concentration on farming and agriculture.

The district's student body consisted of classes for regular education inclusion, academically intellectually gifted, and a self-contained class. Schools located in the northwestern part of North Carolina offer extracurricular activities including athletics, student government, and drama performances. The district utilizes ConnectEd, a website, and social media to keep an open line of communication with the parents, stakeholders, and the community.

According to the district's report card, there has been continuous growth over the last 4 years concerning EOG scores for several of the middle schools. There have been continual efforts to improve students' scores through district initiatives, such as Achieve3000 and IReady, and district-wide practices, such as extra instructional/ enrichment time for 30 minutes a day. Teachers also meet weekly to examine data from various assessments to drive their instruction to capitalize on their students' strengths while using their weaknesses as areas for potential growth. The most recent EOG data show the district met expected growth in all areas while exceeding growth in Math 6 and 7 and English Language Arts 6-8.

Middle schools located in a rural area in the northwestern part of North Carolina have a one-to-one ratio for students and Chromebooks to save money on paper, copying,

and preparing students for the 21st century. For students and teachers to be able to connect to the Internet, the county has provided wireless access points within schools for the students and teachers to connect efficiently. These wireless points of access enable students to take assessments, turn in assignments, and conduct research in a timely fashion while receiving feedback to assist in their educational instruction.

According to the North Carolina report card, most of the district's teachers have more than 10 years of experience. In addition to experience, many of the teachers bring a background familiarity with the community, which helps them to relate to and reach students on their current levels. Approximately half of the teaching staff have a graduate degree or higher in the educational field. Teachers work with the administrative team to complete professional development opportunities to work on areas highlighted by the district as a whole or for learning ways to improve students' scores on the EOGs. Beginning teachers are paired with mentors to provide them with support and expertise as it relates to the school, best practices, and knowledge about their content area.

Administrative teams provide the teachers with a website to help individuals have access to the school calendar, forms, a place to share announcements, and numerous resources. Using the website allows teachers to be on the same page and gives them a commonplace to access pertinent information as it relates to planning, professional collaboration, and signing up for training. The website is also the place where the staff handbook can be found along with minutes from board meetings and state links to help teachers provide pertinent instruction.

Role of the Researcher

I have been in the field of education for over 20 years, serving in numerous

capacities ranging from a bus driver to a seventh-grade social studies teacher. I have taught in four of the central school districts located in North Carolina, all within the middle grades setting. I have taught middle grades social studies, science, mathematics, and English language arts ranging from 60- to 90-minute class periods. I currently serve on the multi-tiered system of supports team to help accommodate students who may need extra assistance or guidance for behavioral or educational purposes.

I interacted with the participants through written and oral correspondence based on what they have experienced in their classroom before and after physical brain breaks. This information was obtained through conversations in interviews, reading written responses from open-ended questions, and experiences shared during the focus group session. As the researcher, it is imperative to remain unbiased to prevent findings from being tainted or skewed. I determined questions appropriate for the participants along with organizing times and places to conduct interviews. Zoom links were used as an alternative to meeting face-to-face. The data were collected, organized, and prepared to inform the reading audience about the perceptions of teachers implementing physical brain breaks.

Overview of Theoretical Framework

The theoretical framework used for this study was a constructivist theory to better understand teachers' perspectives about physical brain breaks in the classroom as it related to their personal experiences or preferences. There is an insignificant amount of research about movement in the classroom and how middle school teachers perceive it. Constructivism explores people's reality based on their individual experiences (Western Governors University, 2020). Teachers' firsthand experiences were examined to better

understand how physical brain breaks have helped or hindered their students' engagement in class.

One of the constructivist principles highlights contextual learning, which means individuals are constantly learning ways to evolve and survive in their environment. Exploring the teacher's perspectives of movement in the classroom provided me with a more in-depth view of how teachers may have tailored various physical brain breaks to meet the needs of their current students in each class. Current research, although minimal, states there is a need for more studies to be completed to understand what teachers may experience when implementing physical brain breaks or the reasons why they have not implemented them. The principal suggested physical action would be a foundation to suggest ways in which teachers can work together to use physical brain breaks to better serve their students (Kurt, 2021).

Definition of Terms

The following terms were used in this study.

Academic Engagement

Students and teacher participating in positive, content related exchanges collaboratively, while synthesizing and analyzing the information being discussed, and providing some written answers to the instruction provided (Gasiewski et al., 2012).

Brain Break

An activity shifting brain engagement from cognition to cardiovascular and/or strength focus (Gonchar, 2014).

Classroom Management

The control of students in an educational setting (Leustig, 2020).

Elective Classes

Classes students choose from that include Spanish, STEM, band, chorus, physical education, and art.

Physical Activity

The act of moving the body (Wong et al., 2014).

Student Behavior

How a student carries themselves in a classroom while completing tasks requested by the teacher, interacting with their peers, and exhibiting a level of focus on the information being covered (Leustig, 2020).

Appropriate Behavior. Actively listening, being respectful to themselves and others, and being prepared to learn (Leustig, 2020).

Inappropriate Behavior. Verbal disrespect, being out of the assigned seat without permission, visual display of the cellular device, or leaving class without permission (Leustig, 2020).

Sedentary

Without movement for a period (Hohnen & Murphy, 2016).

Summary

Employees working for a set amount of time may receive a break to allow time for a brief rest to return to work with the energy needed to complete their assigned tasks. Implementation of physical brain breaks in a classroom may yield the same results but more so in the students' abilities to entertain the instruction being shared instead of practicing behaviors not conducive to learning. The history of recess, or breaks from a task, trace back to the Industrial Revolution in the United States when factory workers

were given breaks from labor on the assembly line. By allowing workers the opportunity to take a break, managers saw an increase in production. Breaks may be helpful in an educational setting as well as the working environment. Teachers may see an improvement in their students' attention or retention of the information taught over a period of time. Individuals are more likely to learn better when information is distributed or spaced throughout the learning environment. Allowing students an opportunity to participate in physical brain breaks may minimize the negative impacts of students constantly participating in sedentary behaviors. While there has not been a massive amount of research completed to determine the exact benefits of brain breaks, there has been enough to show some improvement in student performance and behavior. Research examining the relationship between brain function and physical activity does show there is a connection, and improvements have been seen in individuals suffering from ailments such as Alzheimer's disease. Hopefully, these small breaks given within a classroom setting will inspire students to be more in tune with the benefits of being active and to find some way to provide themselves with physical activity opportunities whether they are given to them or not. Learning using brain-based theories will help teachers incorporate learning objectives conducive to the natural ways students recall, retain, and share the content being studied (Handayani & Corebima, 2017).

Chapter 2: Literature Review

Overview

Expert opinions determine the validity of any claim, and to better understand the research and studies about physical brain breaks, it is necessary to see what the experts have to say. Most of the literature search was conducted using Google Search. Initially, the search was to determine what a brain break was. There are numerous types of brain breaks including artistic, physical, meditative, and breathing. Physical brain-breaks are the category most applicable to the direction of the intended study because it is customary practice in my seventh-grade social studies classroom.

Continued research evaluated the positive impact of integrating physical activity in the classroom. Research studies have shown kinesthetic learning to be a valuable teaching practice, but there have not been enough studies to determine if physical brain breaks in a middle school classroom have a positive influence on student engagement and classroom management. The following literature review supports the idea of more research being completed to better understand if physical brain breaks correspond with students' academics and displaying appropriate behaviors in middle school. Jensen (2015) believed there should be more studies to improve teaching methodology through brain-centered research. Outcomes are unlimited, and a better understanding of the brain could have a profound effect in the educational pedagogy.

Theoretical Framework

The foundation needed for this study encompassed the idea of how it is to examine teachers' perceptions of how physical brain breaks impact their students. A constructivist approach to this study provided a platform to better understand how

teachers perceive the factors of implementing physical brain breaks. Constructivism explores people's reality based on their individual experiences (Western Governors University, 2020). Not to discount the sedentary behavior in the educational arena, but exploring teachers' perception of physical activity as a break in middle grades classroom may result in beneficial results for students and teachers. The idea of people moving is not a brand-new concept; however, including movement in the academic arena using neurology and brain-based research is a newer concept (Willis, 2012). Constructivist theory can be employed to study teachers' perceptions of how physical brain breaks impact student behavior, engagement, and achievement. People react to what they believe or perceive to happen instead of responding to the actual experience (Lopez et al., 2015). During this study, teachers were able to share positive and negative outcomes of implementing physical brain breaks as a classroom management strategy. Research continues to highlight the benefits to students' brains when they are allowed to move in an educational setting (Jensen, 2015). Physical activity is the foundation for brain-based reasoning and learning (Jensen, 2015). Movement activates areas of the brain by stimulating neural networks that may trigger learning (Jensen, 2015). Teachers considering implementing movement, such as stretching, walks, dance, drama, seat changing, energizers, and physical education, should plan based on their student population (Jensen, 2015).

Keeping students engaged in learning and providing opportunities to be physical in class can minimize inappropriate behavior while giving students an opportunity to release excessive energy. The constructivist theory provides teachers the chance to share their perceptions of the effects of physical brain breaks in their professional domain.

Teachers in this study were not asked to participate in physical brain breaks nor was it a district-wide mandate. The participants in this study may have implemented a new movement strategy in their classrooms based on their experiences, desires, and reflections. This study may explain how physical brain breaks can improve brain functions, minimize inappropriate behaviors, and provide more chances for students to benefit because of physical activity. Teachers have the potential to see students more involved in class and beginning lifelong habits to promote a healthier lifestyle.

Brain-Based Learning Theory

The brain-based learning theory explores numerous options in which to maximize learning opportunities for students through brain-centered activities. Brain-based learning encompasses student learning experiences by discovering numerous strategies to enhance instruction while allowing the brains' functions to drive classroom strategies. President George W. Bush designated 1990-2000 as the decade of the brain to increase efforts of informing the public about the benefits of brain research. While the collaboration between neurological and educational fields may not address nor solve all classroom issues, there is a possibility that the two combined may serve to benefit students' learning (Zadina, 2015). The premise for brain-based learning is rooted in meaningful learning (Gözüyeşil & Dikici, 2014). Neurology may play a significant role in justifying brain-based learning. New research has proven neurological research should be considered when planning to educate students. Teachers correctly implementing brain-based learning require the knowledge of how the brains' function can be coupled with instructional practices to benefit their students (Degen, 2014). With new research showing benefits of brain-centered learning, teachers may need professional development opportunities to

learn more ways to understand the best ways to educate students using brain functionality as the foundation. This research directly affects pedagogy, and this partnership has continued to be cultivated to help inform and connect the puzzle pieces of the complex field of neuroscience to education (Tommerdahl, 2010). There is a disconnect between the classroom and the neuroscience lab. Even though education serves as a starting place, the research is needed to understand how one complements the other (Sigman et al., 2014). Educational methodologists may need to revisit and install new pedagogy for students, as the brain is driving the functionality of the student. Brain-based instructional strategies have been found to improve the retention of knowledge, achievement, motivation, and attitude (Uzezi & Jonah, 2017).

Brain-based learning involves the essence of how the brain processes and then organizes instruction to achieve meaningful learning. By applying these principles, educators are giving students better chances for success, as they will be providing the necessary content while encompassing how the brain works. The applied principles will afford students an array of learning opportunities. Brain-based research can examine the diversity found in student populations and how the brain can be considered when addressing different needs. The brain-based learning theory highlights the fact that students have their own circulation and circadian rhythm (Jensen, 2015), which impacts their ability to receive, synthesize, and retain the information teachers are providing. To better process the content they are covering at school, students may need some downtime periodically during the day, possibly in the form of a brain break to allow their brains to refocus and reset the learning concept needed to process the information learned daily (Jensen, 2015). In previous studies, physical activity has helped to promote engagement

among students due to the activation of both spheres of the brain (Corbin & Bugden, 2018).

Brain-based learning may be a beneficial method when trying to increase student engagement (Vyas & Vashishtha, 2013). Teaching with the brain as the foundation of learning versus content is the focus of brain-based learning (Pasquinelli, 2012). Combining education and brain-based learning will enhance teachers' time effectively working with students in lieu of the loss of time with interventions not yielding the desired results (Hohnen & Murphy, 2016). Teachers may have varied opinions on the effectiveness of different interventions and may continue to execute those with which they are most familiar. As neuroscience and knowledge of the brain have continued to evolve, a worldwide movement has developed to gain information and inform educational practices (Hohnen & Murphy, 2016). Teachers implementing brain-based learning opportunities will create pedagogy incorporating the brain functions to help students process information and be able to appropriately store it (Handayani & Corebima, 2017). The brain-based learning theory can be used to equip education professionals with the skills needed to remedy the unfortunate failures of the educational system.

Based on foundational principles of the brain, five concepts for mind, brain, and education sciences have been established (Tokuhama-Espinosa, 2011):

1. Brains are all unique to everyone.
2. Brains are not all equal due to the ability to influence learning and context.
3. Brains change through experiences.
4. Brains are highly plastic.

5. Brains connect new knowledge to old knowledge.

Student learning becomes the teacher's focus when they begin to implement brain-based learning theories (Vyas & Vashishtha, 2013). Employing inquiry-based instruction may help teachers better understand their students' weaknesses and strengths while using brain-based learning principles to guide their pedagogy instead of the typical lecture (Tokuhama-Espinosa, 2011). Teacher willingness to try new and innovative ways to enhance instruction may be impacted by the actual learning setting. When designing the environment, the teacher should consider the learner as the primary participant, provide a space to encourage cooperative learning, attune to the learner, consider individual differences, provide a challenging workload but without excessive work, state clear expectations, and promote real-world problems and cross-curricular instruction (Conner & Sliwka, 2014). Using neurological justifications may help teachers address issues in their classroom, including increasing student engagement and motivation (Hohnen & Murphy, 2016). Once teachers master factors influencing brain function, they have the ability to optimize the cognitive performance of their students by integrating physical activity into the classroom (Jensen, 2015). Teachers can incorporate brain-based learning principles by allowing for physical activity in the classroom. Students being in sedentary positions longer than 20 minutes has a negative impact on their achievements, according to neuroscientists. At a school in the northwestern part of North Carolina, most students sit in classes from 45 to 90 minutes, which may cause students to lose interest in the content being covered. To combat prolonged periods of sedentary positions, teachers can implement some form of physical activity break to help their students refocus on the information being covered. Students participating in physical activity may experience

improved function of their senses, memory abilities, and the activation of the reticular system. When teachers implement instruction using brain-based learning activities such as physical activity, small group instruction, and interdisciplinary strategies, students are more likely to obtain success.

Brain Function

The brain is the organ teachers can shape by inputting important information daily. Research does show a connection between physical activity regardless of how intense it is or the amount of it. The best use of neurological studies is to determine how the brain works to combine the art of teaching with the scientific findings of how the brain responds to stimuli (Willis, 2012). Some studies have seen an increase in memory recognition, while other studies have seen improvement in students in the classroom on a broad behavioral spectrum. The brain develops from the inside out (Field et al., 2015). This is significant because the interior portions of the brain control the basic survival function, the middle layer involves emotional responses, and the outer layer is where our cognitive thought processes occur (Field et al., 2015). It is imperative that teachers consider the brain as the foundation of learning instead of curriculum standards. The connection between movement and the brain's development is the same as physical activity being cognitive candy. Teachers offer sweet treats to reward favorable behaviors in class, so why not reward students' brains with their cognitive candy? Students with more active lifestyles often have healthier brain tissue due to the amount of blood flowing to the part of the brain housing the memory functions. To discover a better understanding of ways in which physical activity influenced students' brains, it would be beneficial to look at several studies.

According to Rosenkranz et al. (2020) in an analysis of 26 studies of the relationship between physical activity and test scores, results showed significant, positive correlations between activity and academic performance for language, math, reading, and on-task behavior. Owen et al. (2016) systematically reviewed and conducted a meta-analysis using results from 38 studies to examine the relationship between physical activity and academic engagement. Accountability for teachers is often determined by state assessments resulting in teachers looking for the best practices to help students obtain scores reflecting the material covered over the year. A multilevel model found physical activity had a small positive association with academic engagement (Owen et al., 2016). Evidence is increasing to suggest physically active students are more engaged with classroom lessons, leading to a positive influence on academic achievement (Owen et al., 2016). Using the aforementioned studies, evidence points to the benefits of implementing physical brain breaks in the classroom, regardless of how limited they may be.

The study completed by Fedewa et al. (2018) compared movement-only breaks versus kinesthetic breaks to better understand the impact on students' educational improvements. The study was conducted in Grades 3-5 for 9 months. The students participating in one group used physical activity to correspond with the educational material. Students in the opposite group just used physical activity breaks without including content. The two groups used standardized testing to determine student success in the areas of math and reading with comparisons of assessments before and after the breaks. Because of the study, students improved in reading if they participated in physical breaks without academic correspondence. The findings from this study should be used to

further examine the relationship between different types of movement breaks and their effect on academic achievement.

Another study was completed in 2012 at the University of California and MIT to determine if students playing would play a role in brain breaks (Glapa et al., 2018). Students in the middle school setting, sixth grade, must transition from routine play breaks during the day to moving from class to class. The elementary schools' routines tend to provide students with more opportunities for play than the middle school. Using an MRI scanner, they studied the brain's neural activity at rest in "default mode"—a state of rest that is usually associated with taking a break or letting the mind wander (Immordino-Yang et al., 2012). Some may consider inactivity as a state of defeat, but the brain is still functioning in its resting state. Even when people are taking breaks, their brains are still working to examine information being taken while also trying to synthesize added information and apply it in areas of life. Using the MRI scanner, neuroscientists can process brain functions and then use this information to better equip teachers with the knowledge needed to better instruct students.

Information from the studies shows how effective the brain is regardless of whether it is at rest or in an aerobic state. Students are often in states of rest as they sit in class, but quick bouts of physical activity will benefit them as well. Quick aerobic exercise, such as standing or getting up and sitting in a seat, can induce generalized cognitive improvements through increased blood flow and neurochemical responses leading to upregulation of neurotrophins (Bedard et al., 2019). To help the brain, which is a very diverse organ, movement is needed to have it work at its best state. Shorts bursts of physical activity positively affect circulation and dopamine production, therefore

increasing attentional states (Jensen, 2015). Small opportunities for physical activity can help increase the movement of dopamine, which helps to increase students' attention. Regardless of how much physical activity is given, even the slightest amount can help students in the classroom.

Movement

According to neurologists, the region of the brain processing movement, the cerebellum, is the same region that processes the movement of thought. Regardless of the amount of movement, the brain may experience an activation of various parts. Even walking caused neutral firing to activate in the deepest, most foundational areas of the cerebellum. When students are participating and show their understanding of the content being covered, it helps the teacher to observe areas of weaknesses and strengths. Differentiated teaching methods continue to move away from memorization drills and lecturing to the implementation of activities beyond the seat (Conner & Sliwka, 2014). Movement helps to improve students' abilities to synthesize and analyze information because of the brain's natural plasticity ability. When students are moving, this helps the brain because it provides some type of stimulation (Quin, 2012). Stimulation then helps to shape the brain's functions and the architecture of the brain (Hinton et al., 2012). Physical activity in the class improves students' brain ability to understand the information being covered (Quin, 2012). In addition to physical activity, physical brain breaks will give students the opportunity to reflect on choices made regarding behavior and academic engagement. The brain being activated during movement has caused brain-based researchers to link the incorporation of movement to increased activation, which in turn, may influence student learning (Jensen, 2015). Physical activity has been linked to

cognition, and cardiovascular exercise affects mental health (Bunketorp Käll et al., 2015). Physical brain breaks complement the brain's functionality and in turn, serve the individual at its best state while in motion.

Brain Breaks

Middle school is the time when our students will incur the most changes and we must provide them with strategies to accommodate them while they are experiencing these changes. The purpose of students coming to school is to be educated. The way to do that is by sharing knowledge with students, which goes through a process that is activated by the brain. Ongoing research has proven that humans learn in numerous ways, but the only way to import this knowledge is through the brain's reception. Studies have shown distinct parts of the brain serve in numerous capacities with the retention and dissemination of information being given. Middle school students are expected to sit in 80-minute classes, pay attention, not indulge in inappropriate behavior, and retain the information being presented by their teacher. For students to capitalize on the information shared, their brains should be in an optimal performing state. The best way to have a student perform a task is by ensuring the student can move because the brain loves oxygen and is performing at its best when it has oxygen. Physical brain breaks have been used in the middle school classroom to help promote information retention and to minimize inappropriate behaviors in the classroom. Physical activity has been shown to have positive effects on children's motor development, physical fitness, cognition, attention, learning, academic achievement, and mental health (Mok et al., 2020). Students learning to take a break while on task may prove to be beneficial long after the middle school setting. Physical activity helps children to develop healthy habits that can follow

them into adulthood (Cline et al., 2021). Even with the benefits associated with physical activity opportunities, recent studies have found that only approximately 42% of children in the United States meet the World Health Organization's physical activity guidelines of 60 minutes a day of moderate-to-vigorous physical activity (Abi Nader et al., 2019).

Reasons for the lack of exercise seen in students are unlimited, and the schools are not able to assist with the problem due to required testing. The No Child Left Behind Act of 2001 has made it challenging for teachers to implement opportunities for students to be physically active throughout the day, due to an increased focus on academic achievement and standardized test scores (Mok et al., 2020). Many teachers do not have the opportunity to implement the best practices for their students, including movement, due to testing expectations. Many schools have succumbed to the decreased opportunities for students to be physically active to increase time for academic instruction (Bailey & DiPerna, 2015); however, teachers can implement small breaks for physical activity to help rejuvenate the brain's function and help students maximize their learning opportunities. Middle school children spend much of their school day sedentary (Watson et al., 2019). Remaining sedentary for prolonged periods may be problematic for students as they may lose interest in the content being covered and resort to inappropriate behaviors. When children are sedentary for lengthy periods, they can easily become disengaged, which can affect their academic performance and overall classroom behavior (Wilson et al., 2016). Students disengaged in the classroom may start to distract other students. This can negatively affect the classroom environment for both teachers and students (Buman et al., 2013). There is a need for educators to find new ways to encourage and integrate opportunities for physical activity into the classroom to support

student engagement, academic achievement, and the overall health of students (Podnar et al., 2018).

Older students get fewer opportunities for movement breaks, such as recess and playtime, throughout the day (Buman et al., 2013), partly because of classroom transition and the expectation of maturation. Outside of school, young adults spend approximately 5-7 hours per day on a phone or computer screen (Rosenkranz et al., 2020), especially with the onset of COVID-19, however, mostly for entertainment purposes. Bailey and DiPerna (2015) believed with no opportunities for school-based physical activity, approximately 50% of children will not achieve the minimum recommended amount of daily physical activity. Teachers can remedy the problem by having students up out of their seats in 60 seconds or less completing quick activities to help their brains refocus. Participation in physical activity is associated with multiple cognitive, academic, behavioral, and health benefits, all of which are important aspects of growth and development throughout adolescence (Stylianou et al., 2016). When exercising best practices, teachers can use a small amount of time to change their students' academic success while improving their health. Mok et al. (2020) said literature emphasizes the positive effects of physical activity on children's motor development, physical fitness, cognition, attention, learning, academic achievement, and mental health. While most middle school core teachers will not be able to offer more than a minute of physical activity, the willingness to try for the benefit of the student is the most crucial factor. Classrooms are constantly used as a new platform for pilot studies deemed as best practices. Middle school classrooms may benefit from implementing physical brain breaks in their classes, as there is research to support the need and numerous ways to

offer these breaks in class. Many researchers feel there should be something done about the inadequate amount of physical activity opportunities students experience while in school (Abi Nader et al., 2019; Mok et al., 2020; Perera et al., 2015; Phillips et al., 2016; Podnar et al., 2018; Rosenkranz et al., 2020; Tumynaitė et al., 2014). Brain breaks are short, simple breaks from learning and can be implemented within the classroom (Ackerman, 2018; Baker et al., 2017; Partipilo & Nillas, 2015; Perera et al., 2015; Trambley, 2017; Weslake & Christian, 2015). The goal of a brain break is to refocus or reenergize students (Baker et al., 2017), helping students to be in the most receptive state for learning (Weslake & Christian, 2015). Students who take a physical activity break before a test displayed increased cognitive control, improved academic achievement, and changes in brain waves (Chaddock-Heyman et al., 2013).

Sitting for periods without an opportunity to get up could lead to mental and physical impairments of the body. Middle school students today have unlimited access to screen time due to social media and school assignments. Students remaining in sedentary positions for long periods may experience negative side effects including the possibility of obesity, myopia, and blood pressure issues (Chang & Coward, 2015). There are other problems linked to the sedentary nature of schools, such as an increase in bullying behaviors (Lowry et al., 2013). While other students experience behavior issues, others may experience a decrease in cognitive abilities (Kantomaa et al., 2013). Schools continue to receive complaints about bullying in the physical school setting coupled with cyberbullying. Reilly (2017) explained how the Center on Educational Policy at George Washington University found that 62% of school districts had increased the amount of time spent on English language arts or math in elementary school since 2001, while 44%

of school districts had reduced time spent on other subject; 20% of school districts had 16% reduced recess in 2007. Ongoing testing in math and English language arts takes precedence over students' learning time, and because of that, some students may not experience any physical activity other than walking from class to class.

Implementation of Brain Breaks

During a time when the public education system is in a continual fluid state, it is imperative for everyone to work smarter not harder. Brain breaks can be implemented in the classroom within 30 seconds or more depending on the teacher and students. Working smarter and not harder is an example of maximizing the brain's functionality. Classroom teachers have a desire to implement physical activity brain breaks but they indicated there was a lack of time, funding, space, and teacher training to do so (Perera et al., 2015). Teachers may choose to use brain breaks found on YouTube, or they may create and tailor them to the students they are teaching. Movement has proven to improve students' cognitive functions, but teachers often do not get the support they need to use physical activities in their classes (Geertsen et al., 2016). Teachers can get their students up on their feet to do several quick movements to refocus their brains.

Some middle school teachers do not see the need to provide physical brain breaks in class because it is not something to which they are accustomed. SHAPE America (2017) discouraged teachers and other school and community personnel from withholding chances for physical activity. Research in educational settings shows how implementing brain breaks was found to be beneficial for students and teachers. Baker et al. (2017) studied the implementation and evaluation of environmental and policy interventions for promoting physical activity in rural schools and found there are fewer

opportunities to be physically active during the school day than in past decades, as schools must meet academic achievement standards (p. 539). Teachers who implemented brain breaks during the study saw the benefits, but their focus remained on the prescribed curriculum (Baker et al., 2017). Brain breaks can be used to promote academic success, but they should not be the dominating factor in a class.

Benefits

Lack of physical activity is also associated with an increased risk of developing chronic health issues, including heart disease, Type 2 diabetes, and cancer, in addition to obesity (CDC, 2021). Teachers have had to deal with so many pressing issues within the classroom, in addition to students' issues associated with being overweight and constantly sedentary. According to the Journal of School Health, physical activity is one of the many factors to influence the growth and development of children, especially in regard to their overall health and well-being (Rosenkranz et al., 2020). Students deal with bullying, mental health issues, caring for others, food shortages, and so many other problems. Regular physical activity can increase weight management, improve sleep quality, lower blood pressure, build stronger bones and muscles, increase heart and brain health, improve balance and coordination, and decrease the risk of developing certain types of cancer. Professional organizations have laid out the criteria and areas of concern when dealing with the physical health of students. Some teachers must take time out of their instruction to help students with elements of unhealthy lifestyle choices. Physical activity can also have a positive effect on mental health in youth (Buman et al., 2013). Beyond chronic diseases, physical activity may help to ameliorate stress, sleep disorders, anxiety, depression, and problem behaviors, and increase overall well-being (Rosenkranz

et al., 2020). Physical activity releases chemicals in the brain that help to boost self-esteem, improve concentration, relieve stress and frustration, and increase feelings of confidence and self-worth (Stubbs et al., 2018). Improvements in the way adolescents see themselves in society are constantly tainted with body shaming, but physical brain breaks may have a positive impact on students improving their ability to focus in class while feeling better about themselves. Despite academic pressure, schools can serve as prime opportunities to improve children's physical activity because most children are in school for long periods. Students in middle schools in the northwestern part of North Carolina attend school from 7:45 a.m. until 3:20 p.m., not to mention after-school activities. Even with so much time concentrating on tested subjects, classroom teachers can give small opportunities for physical activity in the classroom. Students participating in brain breaks were more productive, learned new social skills, and paid closer attention to the functionality of their brains receiving a boost (Terada, 2018).

Physical brain breaks can be used as coping skills to help students as they continue to mature into adults. Classrooms integrating movement can improve students' academic abilities (Bedard et al., 2019). To find success with classroom physical activity implementation, more research is needed regarding the age appropriateness and the types most beneficial for the students receiving them (Bedard et al., 2019). The brain is at its best receiving state when it has oxygen, and the best way to get the oxygen flowing is through movement. Hillman et al. (2014) found that fitness boosted both learning and memory for children and that the association was most prominent when the initial learning was more challenging. The implied research question was, "What is the relationship between aerobic fitness, learning, and memory" (Hillman et al., 2014)? The

implied hypothesis was that participants with better aerobic fitness would have increased learning capabilities and better memory (Hillman et al., 2014). Participants included 48 children between the ages of 9 and 10. Of those, 24 were in the "high fit" group, and 24 were in the "low fit" group (Hillman et al., 2014). The high fit group had 14 females and 10 males (Hillman et al., 2014). The low fit group had 12 females and 12 males (Hillman et al., 2014). Instrumentation for the Hillman et al. study included legal consent of participant and guardian, pre-participation health screening, Attention Deficit Hyperactivity Disorder (ADHD) Scale IV, health history, Kaufman Brief Intelligence Test II (KBIT II), Maximum Oxygen Uptake (V02 max), and a map assessment. The Hillman et al. study took place over 3 days for participants. Day 2 included instruction on names and locations of regions on a map using the study only strategy and a test and study strategy (Hillman et al., 2014). Participants were randomly assigned to the strategy order and counterbalancing occurred within each fitness group to ensure the orders were equal across groups (Hillman et al., 2014). Day 3 was a recall day where participants returned the next day after the learning day to complete the recall portion of the assessment with a free recall test or a cued recall test (Hillman et al., 2014). Again, participants were counterbalanced for order, such that half of the participants were first tested the day prior with the study only condition and half first tested on the test and study condition (Hillman et al., 2014). Analysis for the Hillman et al. study included omnibus analysis, ANOVA, Bonferroni Correction, and post hoc analysis. Overall, data in the Hillman et al. study indicated that interspersed testing and study as well as higher levels of fitness produced improved learning and performance on memory tasks. Fitness differences did not produce statistically different findings on the learning day (Day 2) but

did on the recall day (Day 3; Hillman et al., 2014). When looking at only the study only condition, fit participants outperformed their low fit peers on Day 2 (Hillman et al., 2014).

Challenges

Time is often the deciding factor in a teacher's decision to incorporate new activities into the classroom. Other areas of concern may include resources, classroom management, and the teacher's attitude toward the new initiative. Teachers needing more training, observation of teachers implementing physical activity, and the credibility of physical brain breaks are barriers (Goh et al., 2013). Teachers do not get much say in district- and state-wide programs being implemented in the classroom. For teachers to implement a new initiative, time, resources, and help should be given. Doing so gives the teacher the insight needed as they plan to begin these new practices. Issues dealing with space, time limits, and the lack of materials may hinder teachers from implementing physical brain breaks in addition to classroom management, uncertainty about the outcomes, and personal ideas (Stylianou et al., 2016). Teachers may not have a personal belief about movement in their personal lives, and this could be a barrier when introducing physical brain breaks to their students. Administrators also play a role in the implementation process of physical movement in the classrooms because their responses to what they see taking place in class will either motivate teachers to continue the practice or stop (Centeio et al., 2014; Stylianou et al., 2016). Procedures and structures must be in place prior to implementing brain breaks to ensure the students understand how to participate in the break and then how to return to the prior task without incident. New practices in the classroom are more effective when teachers are consistent in their

approach with the support of the administrative staff (Erwin et al., 2011). Classroom management must be in place before teachers try to incorporate new practices. Students must know what is expected from them along with understanding the importance of an appropriate reaction to the new practice. Giving students the option to share their feedback will also help teachers when trying to finetune a new practice. Some rural communities lack important environmental resources to promote physical activity (Baker et al., 2017). In addition to numerous factors beyond their control, teachers' lack of knowledge, training, or willingness may cause teachers to have a negative association with movement in the classroom (Dinkel et al., 2017). Some teachers may accept some elements of brain-based learning theories with resistance, due to the lack of proven research.

Physical Brain Breaks and Student Achievement

Student progress is what most teachers hope for, as it proves the teacher has completed their job and students have what they need to move to the next level. As proven in previous studies, there is a benefit to students who participate in physical activity in the classroom. When teachers implement new interventions with confidence and consistency, students often experience success. Classrooms incorporating movement along with academic directions may see benefits in students' performances. To help teachers provide optimal learning opportunities for their students, programs with physical activity can be implemented to improve student behavior and performance throughout the school year (Fedewa et al., 2018). Movement in the classroom does not have to take an enormous portion of class time, but small 30-second physical activity breaks are beneficial to students, and they have helped students to improve their scores on state

assessments in math and reading (Kibbe et al., 2011; Maher, 2011). Students with cognitive delays, impairments, or learning disabilities may benefit the most when movement is incorporated into the classroom (Erwin et al., 2013; Fedewa et al., 2018). On the other hand, students who exceed academic expectations are more likely to participate in sports and other physical activities outside of the classroom (CDC, 2018). This past year, teachers from schools in the study grew their students four times more than the expected growth in English language arts in Grades 6-8, math in Grades 6 and 7, and science in Grade 8.

Students have an array of ways to achieve their goals in a classroom, negative or positive. Some students report to school to learn, while others come for social engagement, a safe place, or two guaranteed meals. Most teachers look to ensure students' needs are met before pouring in the content they are expected to teach. By ensuring students feel they have achieved their goals, teachers will be able to provide students with instruction, and over time, teachers can expect to see progress and student achievement on all levels. When teachers implement evidence-based approaches, students are more likely to be more engaged because the teacher's confidence can improve the amount of instruction given while motivating students to be interested in the content being covered. Academic achievement is often evaluated as a student's achievement in a particular subject as assessed by standardized national assessment tests within a school or educational setting (Käll et al., 2014). Benefits of incorporating physical activity include managing emotions, showing respect and empathy for others, and creating positive relationships with peers, which can be associated with better academic achievement (Dean et al., 2018). Physically fit students have been known to be

more successful on exams like the Scholastic Achievement Test, as movement contributes to better working memory and a longer attention span (Geertsen et al., 2016). When students are presented with the opportunity for positive development of lifelong skills, they are more likely to find success over time (Remler & Van Ryzin, 2011).

Many middle school students achieve higher grades in gym/PE because they are often given the opportunity to practice physical activities they used to participate in during recess. If students are not allowed opportunities for physical play, they will, when given the opportunity to play, engage in more intense and sustained bouts of physical play than they would have done if not so deprived (Pellegrini & Smith, 1998). This may explain some of the undesirable classroom infractions teachers see. Wiebelhaus and Hanson (2016) examined student behavior and attention levels during classroom-based physical activities. Their results indicated that student behavior was positively impacted by physical activity during instruction time. Wiebelhaus and Hanson took account of how students felt before and after the physical activities, examining whether they could focus better. Results indicated a decline in nonconformity behaviors among students, fostering improved attention to classroom activities. Based on the research, students are more likely to find success in the classroom when they are given a break to enhance their brain functions.

Physical Brain Breaks and Student Engagement

Student engagement is necessary for teachers to achieve their goals; however, when students are not fully engaged, this may lead to academic demise, inappropriate behaviors, and less instructional time. Teachers are expected to keep students engaged regardless of the time students are expected to be in class. Currently, middle school

students have numerous options to engage, which may not lead to academic success. Students actively engaging in class are less likely to have time to create classroom disruptions. Most teachers work tirelessly to provide a classroom setting without inappropriate disruptions. Students not involved in classroom activities mirror their lack of engagement on assessments during their academic careers (Fuller et al., 2018). Middle school educators must compete with cellular devices, love interests, and raging hormones, all while trying to keep the students engaged. According to Buman et al. (2013), school engagement is one of the most critical factors underpinning academic performance and the successful development of youth in society. Students in higher grade levels tend to be less engaged in class and do not perform their best academically (Buman et al., 2013). Allowing students the opportunity to get up and move using physical activity breaks can be a strategy to increase student involvement in the educational setting (Abi Nader et al., 2019). Students and teachers will both benefit from having small physical activity rates to stimulate the students' worries and in turn, students will have the renewed opportunity to return to learning refreshed and ready to engage in the instruction being shared. Children who are struggling in the class may not need additional classroom time but physical activity instead (Rosenkranz et al., 2020).

So many rewards are associated with student engagement such as good grades, improved learning, and recognition for making beneficial learning choices. For instance, extracurricular activities such as sports, drama club, and school government association are only available to students who have performed appropriately in class last, which is often associated with students having the grades to reflect engagement in the classroom. Middle school provides the opportunity for extracurricular activities, and for some

students, it becomes a priority in the student's routine, as seen in the time invested at rehearsals, practices, and meetings. Students lacking the knowledge of how to deal with new priorities may experience stress and a lack of engagement at school. Even though extracurricular activities do not take place in class, a student's behavior and academic achievement determine their ability to participate.

Physical Brain Breaks and Classroom Management

Effective classroom management lays the foundation for students to learn in a structured environment. Some teachers put in more time training, planning, and implementing strategies to improve classroom management only to have students still behave inappropriately. At a rural school in the northwestern part of North Carolina, teachers are encouraged to recognize positive behavior practices while not allowing unfavorable behaviors to develop in a learning opportunity. Classes experiencing the most success have teachers who have set forth clear expectations, routines, and procedures about what is expected and what is deemed unacceptable behavior. Most schools provide structure, expectations, and routines within the first week of school to provide students with an orderly and safe learning environment. In addition to teachers explaining the school-wide routines, most are also teaching students their classroom norms. Student expectations and rules should be posted in a location that is visible after the teachers have reviewed what is expected and the consequence associated with not following the expectations. Classroom rules include clear expectations of appropriate student behavior, and they should be posted before the first day of school. When teachers take time to explain and model the expectations, often this prevents a lot of misconduct because students have a clear understanding of what is acceptable behavior. Student

problem behavior continues to be a major concern for teachers (Harrison et al., 2012). The middle school years (Grades 6-8) mark the beginning of a particularly vulnerable time for developing problem behavior. Transitioning from elementary to middle school creates opportunities for school sports, participation in extracurricular clubs, and an increase in the number of other students with whom they are in contact. The new atmosphere sometimes causes a loss in the academic skills acquired in the elementary setting, preventing a successful transition into these new settings. Teachers in the middle school setting do not have the same students all day, in contrast to some of their elementary peers. Middle school teachers may have their students for 90 minutes max, and class size could be anywhere from 20 to 40 students, making it hard for teachers to give students extra help. Teachers are constantly looking for ways to minimize inappropriate classroom behavior and ways to increase the amount students participate in class through best practices; however, teachers report inadequate training as a significant barrier to implementing research-validated new practices (Reinke et al., 2011). To bridge the gap between research and practice, experts recommend increasing the training, coaching, and support offered to teachers of students manifesting behavioral difficulties (Reinke et al., 2011).

Physical activity purposely infused into instruction helps to reduce inappropriate behavior in comparison to students not receiving physical activity. Inappropriate behaviors may be reduced after physical activity has been systematically implemented into a classroom. Godwin (2016) connected with most educators when she stated, “Loss of instructional time due to off-task behaviors is a well-established problem in educational settings, recognized both by researchers and practitioners for over a hundred

years" (para. 1). The list of reasons for off-task behavior can go on forever, and even the most seasoned teacher will have to deal with unwanted behaviors. With the appropriate training and willingness to learn new techniques, teachers can produce an atmosphere where students can release energy through movement, in turn helping students to become more involved in their academics (Camahalan & Ipolk, 2014). Based on the research and literature, brain breaks would be a great strategy to use in a class to help students redirect their excess energy while cutting down on inappropriate behaviors.

Physical Brain Breaks and Teacher Engagement

In addition to teaching, teachers serve as custodians, substitutes, counselors, nurses, parents, and numerous other roles. More importantly, teachers are leaders in their classrooms, and they have the ability to implement changes they feel are beneficial for their students. Teachers using physical activity in the classroom have reported favorable outcomes and perspectives (Dinkel et al., 2017; McMullen et al., 2014; Webster et al., 2015). However, teachers are likely to participate in the best practices for their students, not only for academic and personal purposes but also for their overall health. Teachers are leaders within their classes and school building, and they have a direct impact on the students buying into new activities based on their attitudes and their buy-in methodology. Often, teachers are asked to review their students' data to understand where students are finding success versus where their weaknesses lie in determining what is and is not working. Neuroscience education can be used to provide corrective training to help teachers become more effective in understanding how students learn versus learning to teach methodology. Beginning teacher programs do not address the need to understand how complex the brain is and how it can be used to be more effective.

Due to the overwhelming schedules of teachers, the time to research best practices is limited and may result in a disconnect between researchers and educators. Neuroscience regarding brain research can help educators improve student learning and achievement (Jensen, 2015). Teachers and students continually develop their skills and seek better approaches (Conner & Sliwka, 2014). As neuroimaging and educational neurology have advanced, knowledge has been gained about the brain's structures and arrangement (Anderson et al., 2016). With the application of recent technology to the learning field, educators have new ways of employing their current knowledge to better serve their students through brain-based lenses. These types of brain functionality discoveries have required changes in the professional learning teachers receive and in the tools and methods used to educate people (Conner & Sliwka, 2014). A few slight changes in instructional practices can make significant differences in student teaching (Butler & Cuenca, 2012). The school can be used as a platform to examine and better understand the dynamic connections between the brain's functions and movement while in the classroom (Käll et al., 2014). Before teachers understand the benefits of physical brain breaks, they may need to understand how the brain works. Teachers learn ways to engage, structure, and manage students without knowing how the adolescent brain works. Middle school teachers often observe quick changes in their students within a year and understand the hormonal changes without an explanation of the role of the brain. Becoming more aware of how an adolescent brain works may help students because teachers will be able to provide opportunities for success based on the most important organ in the body. Teachers are leaders in and out of their classrooms, and they could steer students in their desired directions based on their presentation and motivation. The

importance of the concepts may not appear as important to students unless a teacher puts some type of motivational force behind it. The main questions for educators and educational neuroscientists to answer are (a) how the brain works and (b) how to develop instructional practices that are scientifically valid and confirmed to enhance learning (Boyles, 2014). Research has indicated student achievement is impacted by teacher knowledge and perceptions about educational neuroscience, professional development and classroom strategies used, and curriculum choices (Zadina, 2015). When teachers expand their understanding of research-based strategies, the classroom, and the brains' learning abilities, students are likely to experience positive outcomes (Conner & Sliwka, 2014). By teachers giving brain breaks, they are also modeling for their students how to take the break, return to the current task, and show their belief in the practice. Some are also preparing the students for what is expected before the actual break, during the break, and when they return from the break. Pellegrini and Bohn (2005) outlined the history of recess, or breaks from a task, tracing it back to the Industrial Revolution in the United States, where factory workers were given breaks from labor on the assembly line. Pellegrini and Bohn argued breaks are necessary and appropriate in the educational setting too.

Physical activity brain breaks were well received by teachers and students alike and, according to teachers, improved students' concentration while providing a beneficial amount of physical activity (Perera et al., 2015). Ackerman (2018) found that by taking a few minutes of instructional time and devoting it to physical activity, students did not need as many reminders for their off-task behaviors and were spending more time engaged in the instruction that followed. The rationale behind this discovery can be a

result of the brain's renewed ability to obtain information after movement has supplied oxygen. Partipilo and Nillas (2015) also found that after a physical activity brain break, students were engaged in their work, did not require redirection, and got back to work quickly and quietly. Teachers may start to see more desired behaviors in the classroom when they effectively implement brain breaks. After completing a study, educators reported an increase in students focusing while inappropriate behaviors started to decrease after using physical activity brain breaks had been implemented (Baker et al., 2017). In addition to the positive reactions seen, teachers also witnessed students focusing more and being more involved in class The positive effects observed can be used to improve students' behaviors and academic achievements. As students become more engaged, teachers may see improvement in students' behaviors and their academic achievements. As Dinkel et al. (2017) pointed out, schools can serve as prime opportunities to improve students' physical activity because the vast majority of children attend (97%) and spend a large amount of time in schools, 6 or more hours/day, 180 days/ year). Schools implementing brain breaks may observe positive changes in staff and student morale if all parties involved are experiencing more oxygen to the brain, which could boost learning. Finnish teachers participating in their physical activity incorporation program experienced a more peaceful and enjoyable place of work (Kämppi et al., 2013). Movement can create the release of adrenaline, causing most children to become more attentive and ready to learn. Experts have found that activities such as standing and stretching, noncompetitive group games, and walking excursions can improve cognitive function (Jensen, 2015). Physical activity resulting in an increased heart rate has been related to better performance on assessments (Jensen, 2015).

Teachers' expectations, both spoken and unspoken, influence the implementation of any new program in the classroom. When implementing physical brain breaks, teachers may have to model or create buy-in from the students to reap the full potential of these activities. In past studies, teachers' beliefs and expectations have had a tremendous impact on the outcome (Hohnen & Murphy, 2016). Teachers influence their students on so many levels. Incorporating brain breaks into the classroom may be a lifelong lesson students can always have to fall back on and use it to encourage others to love on their brains. An important part of the instruction given by the teacher is intended to motivate and instruct to develop intelligence (Wilson et al., 2016), which will always be a positive attribute.

Summary

Research points to the need for more evidence to solidify the idea that physical brain break opportunities should be considered in the educational field. Teachers taking the time to offer physical activity in the classroom in the form of breaks will potentially deepen their understanding of how the physical brain benefits their students. Learning experiences activating emotions, movement, and music contribute to lifelong lessons for students (Salem, 2017). With the current health crisis surrounding students, physical brain breaks should be considered as an intervention to promote brain-based learning in hopes of increasing student achievement and minimizing inappropriate behavior. The study of the brain in teacher preparation programs has earned its place in the educational realm thanks to the use of neuroimaging. Educators could implement physical brain breaks in their classes with established activities or methods they may have produced themselves. Established activities may include a scheduled lap around the school or

designated days of the week for specific activities. Movement in the classroom has been proven to be beneficial to students through increases in performance on standardized tests, student engagement, and meaningful learning opportunities. While obstacles are expected, teachers have the ability through their leadership and understanding of stimulating the brain to rise above to equip their students with a lifelong lesson.

Chapter 3: Methodology

This chapter introduces procedures that were used to better understand teachers' perceptions of physical brain breaks while encompassing physical brain-based learning. Neuroscience regarding brain research can help educators improve student learning and achievement (Jensen, 2015). The importance of prioritizing the brain's function will help teachers better understand how physical brain breaks will impact their students academically and behaviorally. The literature review examined the experiences in classes from elementary to college, but none provided definitive conclusions about how teachers perceive the information about offering physical brain breaks in middle school classrooms. Research shows some teachers practice brain breaks, while others did not feel they have the time to incorporate them into their daily lessons. Other qualitative research studies suggest more studies are needed to evaluate how administrator and teacher perceptions of brain-based learning influence the use and understanding of brain-based instruction (Chiang et al., 2014; Degen, 2014; Edelenbosch et al., 2015; Saleh & Aziz, 2012; Umar et al., 2012). This section provides information about the research design, the participants, data collection instruments, and how they will be employed in an analysis of the data. The following research questions were explored during the study:

1. What are middle school teachers' perceptions of physical brain breaks, and how do these perceptions impact classroom management strategies?
2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom?
3. What themes exist among middle school teachers concerning physical brain

breaks?

Research Design

A qualitative methods design was used to collect information from interviews and surveys. I gathered the individuals' responses to questions about physical brain breaks after deploying a survey asking teachers their views on what physical brain breaks are, how they can be used, and what they look like in motion. The research design provided a better understanding of the participants' perceptions of physical brain breaks. The data from the surveys identified the teachers giving physical brain breaks versus those who do not, how often they give them, and their perceived outcomes. The surveys gave a snapshot of the participants along with their content area and the grade level they teach. This also gave me an idea of how many teachers understand what a physical brain break is and if they are employing them in their classes.

Participants were invited to participate in the focus group process through school email. The number of invitees was based on the individuals' replies to the surveys. It was my goal to have 25% of the potential participant pool participate in the survey phase. Individuals who participated were asked for permission to be recorded and they were informed their actual names were not used once the data were published. The participants had access to the data and the right to remove themselves from the study. The data from the focus groups examined teachers' personal beliefs and choices and district expectations to understand how the perceptions of the teachers have guided them in implementing physical brain breaks or the lack thereof. The research also examined teachers' perspectives of physical brain breaks, no matter how small, and how they have impacted their students' engagement and behavior. Teachers' perceptions of classroom

management and how it impacts their ability to implement physical brain breaks were explored. Focus group questions allowed participants the opportunity to candidly share their opinions and concerns about teaching knowledge to describe their perceptions of physical brain breaks. Reasons for implementing brain breaks were discussed while also determining if the teacher had the same experiences with all of their classes. The direction of the focus group questions was guided based on prior research. Participants had the option to respond to the questions in written format or through a recorded method. These options were available for individuals whose schedules may not allow for time to sit down due to the determined scheduling of the entire group. The interviews yielded qualitative data to better understand the participants' perspectives on physical brain breaks. Studies completed in a qualitative manner help a researcher to examine people's lives to see what people think about the outcomes of different possibilities (Yin, 2018). The purpose of this strategy of inquiry was to understand the relationship between teachers giving physical brain breaks and student attentiveness in middle school classrooms. It also gave teachers an opportunity to express any changes they may see in their students' behaviors. At this stage in research, the relationship between physical brain breaks and teachers' seeing improvement in student achievement was defined as teachers using physical brain breaks to see increased attentiveness and an increase in achievement in the students they teach.

To help keep the results of the research from being tainted, due to the teaching relationship I may have with some of the participants, I explored the possibility of retaining a trained interviewer for the focus group. It was my goal to be able to get the focus group scheduled to meet at an opportune time for all who were planning to partake

in the discussion. Information obtained from the participants gave me a better understanding of the participants' perspectives on physical brain breaks along with the possible benefits and challenges.

After dissecting the data, I looked for themes associated with the research questions. I looked for trends among the grade levels. Repeated words were noted in relation to the questions being asked. Relationships among the main concepts were reviewed to better understand the perspectives being shared. After interviewing the participants, I hoped to have a clearer understanding of the teachers' and administrators' views of physical brain breaks at a school located in the northwestern part of the state.

Participants

Participants were middle school teachers in a district in the northwestern part of North Carolina. Core classes include math, social studies, English language arts, and science. Some teachers have not received formal training but implemented the practice while following the example set by a fellow teacher to ensure their mental well-being. Some teachers may have attended professional development on how to implement physical brain breaks while educating teachers about the importance of considering the brain's function when planning learning activities. Some classroom teachers may have brain break buckets with popsicle sticks that have activities written on them for the students to do.

Procedures

When I was moved from eighth grade to seventh grade, I did not know how I would last teaching 90 minutes straight. I knew I had to do something to survive. I decided to take a break halfway into each class period. During the break, I would line the

students up and take them for a lap around the school. It was a success. After attending a multi-tiered system of supports conference at the North Carolina Center for the Advancement of Teaching, I learned I was giving or participating in physical brain breaks. I continued to give brain breaks if we were not on an alternative schedule due to testing delays or early dismissal period 2 years in, and I started noticing other teachers taking their students out for physical brain breaks. I began to ask teachers about their knowledge of brain breaks to find out what they were doing in their classrooms. The possibilities were unlimited.

After deciding to complete a formal study on physical brain breaks, I asked my principal what she thought about the research, and she thought it would be a great idea. I then sought approval from the district. As I continued to research, it became obvious that movement not only could help middle school students but people suffering from memory loss as well. My dissertation chair was decided a year into the doctoral program, and I began planning the study. The committee met to determine the correct instruments to use along with determining validity in any other procedure needed to complete the process. The district was aware of the proposed study and received information from the Gardner-Webb University Institutional Review Board process. After receiving approval, I sent out the surveys using the district's email platform. The surveys were on a Google Form, and participants who agreed to participate in the focus group received follow-up information about the meeting specifics.

Instrumentation

Surveys

After completing the Institutional Review Board process, district teachers were

asked to complete the survey provided in a Likert scale format. The survey was completed using Google Forms to be sent via email on a Monday asking for responses by the following Friday. A reminder was sent out Thursday and Friday morning with the answer session closing at 11:59 p.m. that Friday. Participants had the option to self-report their contact information if they were interested in participating in the focus group.

To ensure the validity of the survey, the Lawshe method was applied by having middle school stakeholders review the survey questions. These stakeholders were considered as an expert panel because their expertise encompassed the middle school spectrum, and their combined experience helped to encompass the necessary information. While the survey was sent out to all middle school teachers in the district, an expert group examined the 10 questions to ensure they provided the participants with the scope needed to better understand their perspectives about physical brain breaks. If the expert group found concerns, they shared their feedback and suggestions to resolve the problems.

The following survey questions were used to gain better insights about the teachers, their preferences, and their experiences with physical brain breaks. The answers also showed middle school teachers in the district who are not implementing physical brain breaks. The questions also allowed the responders to share information pertinent to their personal classroom.

1. What grade(s) do you teach?
2. What subject(s) do you teach?
3. In class, do you give your students an opportunity to take a break from learning?

4. In class, do you give physical brain breaks as is in giving students a break from active learning while participating in some type of movement?
5. In total, how long does your physical brain break(s) last?
6. Do you give the same physical brain breaks daily?
7. Do you think students benefit from physical brain breaks?
8. What challenges do you experience giving physical brain breaks?
9. What prevents you from giving physical brain breaks?
10. Would you like to learn more about physical brain breaks?

Phase 2: Focus Group

After the focus group participants were determined, I scheduled a time with individuals to see when they were available. Participants were determined based on their willingness to participate. A signed consent form was obtained from the participants prior to the focus group taking place.

Focus group questions were written in a format to examine teachers' perspectives about physical brain breaks. The participants' background information was not requested to provide anonymity to the participants. The focus group questions asked were

1. Describe a physical brain break.
2. How long do physical brain breaks last?
3. Do physical brain breaks have an impact on classroom management?
4. Does classroom management affect a teacher's ability to implement physical brain breaks?
5. Do you think it is important for educators to consider students' brain functions prior to planning instruction?

6. How do you think physical brain breaks impact students? (In what ways do you think physical brain breaks impact students?)
7. How can physical brain breaks impact teachers?
8. What challenges may educators experience when implementing physical brain breaks?
9. What benefits may educators experience when implementing physical brain breaks?
10. Do you believe you are incorporating brain-based learning theory into educational practices when giving students physical brain breaks? Why?

Alternate questions were not devised after examining the data from the surveys. Questions 1-10 served as the initial questions with approval from the committee.

Data Collection and Analysis

Data collection was derived from a qualitative study of the focus groups and surveys. After determining the teachers who have implemented brain breaks with fidelity, I used the teachers who did not use brain breaks as the control group. I looked for common themes in the data collected. Data were assessed to determine teachers' perspectives for implementing physical brain breaks or for not choosing to use them in their class. Table 1 provides an explanation of how survey and focus group questions were used to address the research questions. These data may also be used to better understand a teacher’s motivation for implementing new practices in their classroom.

Table 1

Research Question Alignment With Survey and Focus Group Questions

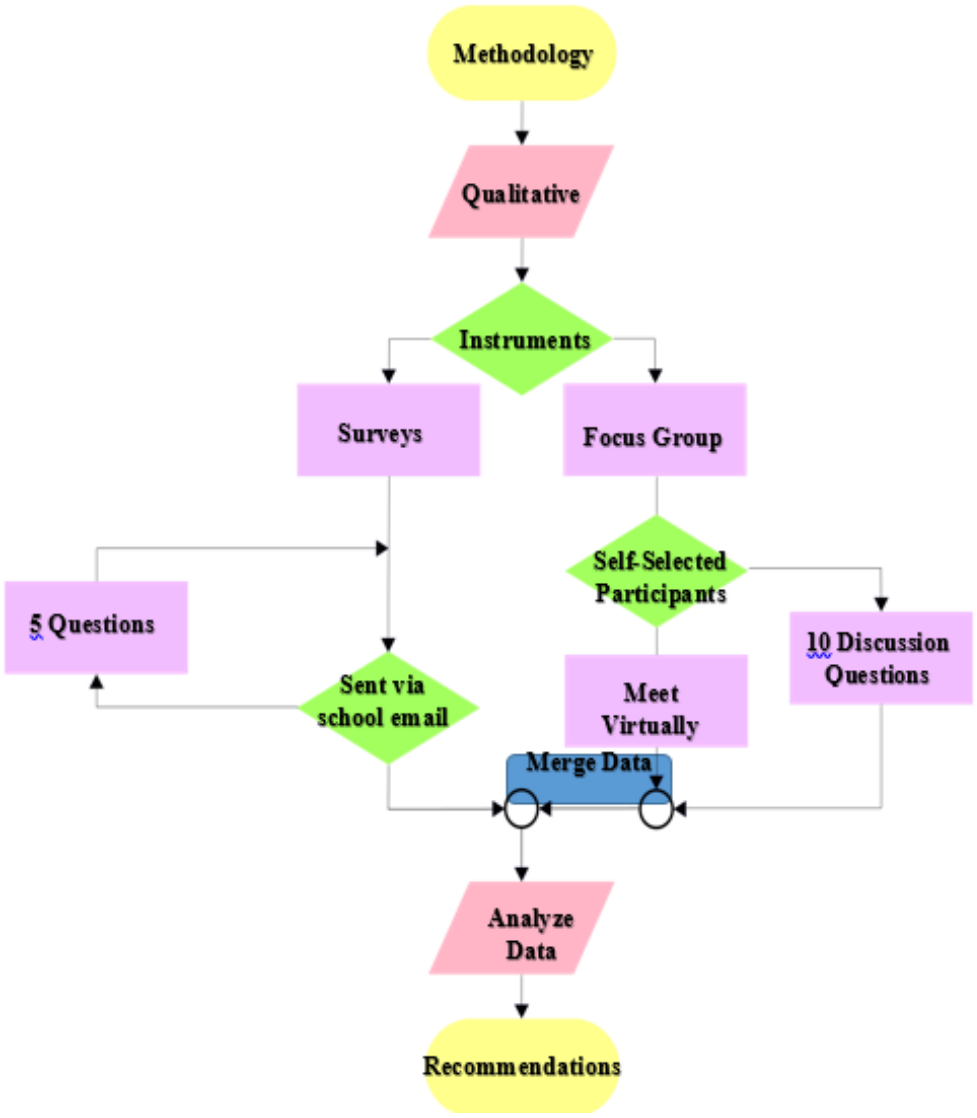
	Research Question 1	Research Question 2	Research Question 3
Survey questions	3, 4, 7, 10	3, 4, 6-9	1-10
Focus group questions	4, 5, 6	1, 8, 9	2, 7, 10

The first research question was examined using four questions from the survey and three questions from the focus group. Research Question 2 was addressed with six questions from the survey and three from the focus group. The last research question was addressed with all the responses from the survey and three from the focus group questions. The survey and focus group were used for qualitative data collection purposes.

The methodology flow chart helps to illustrate the processes associated with the research process. Figure 1 provides a guide through the qualitative phases of the focus groups and the survey explaining the dissemination of the emails, data collection, and how the analysis of the results would lead to the recommendations.

Figure 1

Methodology Flowchart



The methodology flowchart, as seen in Figure 1 and in Appendix A, outlines the type of research being used to analyze the research questions. After examining the research questions through qualitative data collection, the data were analyzed. Following the analysis, conclusions were drawn about the data, and recommendations are outlined in Chapter 5.

Summary

The research provides some insight into the effectiveness of physical brain breaks based on the teachers' perspectives participating in the study. This will help others to better understand how students' brains should be considered when planning to educate them. I hope the participants will gain a better understanding of their practices and how they have influenced their students' lives. The study helped to further prove there is more research needed to better understand how movement can be used in a classroom to support brain functions to optimize learning. Hearing from individuals who are in the classroom daily should help to provide educational stakeholders with valuable information for determining future decisions. The constructivist theory helped to better understand the information derived from the individuals who participated in the study and were employed when sharing suggestions for the future of physical brain breaks.

Chapter 4: Results

The purpose of this qualitative study was to better understand teachers' perceptions of the benefits and challenges of implementing physical brain breaks in middle school classrooms. Research on how educators use physical brain breaks is needed to better understand the similarities of the teachers who do implement them (Webster et al., 2015). President George W. Bush designated 1990-2000 as the decade of the brain due to an increased effort to bring public awareness to the potential benefits of brain research. Although the field of neurology has not resolved all the educational issues, the new collaboration between fields can affect the process of learning, teaching, and educational reform (Zadina, 2015). More research is needed on how to effectively integrate physical activity into academics in addition to understanding age-appropriate physical activities for the students being taught (Bedard et al., 2019). Middle school students interviewed over a 3-year study reported they felt they needed more physical activity each day (Booth & Gerard, 2011). Classroom teachers can remedy the need and desire for students to experience more movement by having students participate in physical activity for 60 seconds or less. The Physical Activity Guidelines for Americans recommended kids and teens get at least 60 minutes of physical activity every day (CDC, 2021). The purpose of this study was to better understand teachers' perspectives of physical brain breaks in a middle school located in the northwestern part of North Carolina. There has been little qualitative research completed to better understand the support given by other teachers, the district, and administrators concerning giving resources and training for classroom physical activity (Dinkel et al., 2017). To promote the use of classroom physical activity to teachers not currently doing it, an understanding

needs to be developed from other teachers participating in the practice (Webster et al., 2015). The education population may have a better understanding of the importance of incorporating physical brain breaks into the classroom and how brain-based learning can guide educators as they prepare to instruct the content. By doing so, it is expected students will be more attentive in class, retain more information, and refrain from inappropriate behaviors causing disturbance to others. There is a need for more research in brain-based learning theory as it relates to classroom movement and how teachers and students participating in physical brain breaks could be taking a step towards a healthier brain. Participation in physical activity is associated with multiple cognitive, academic, behavioral, and health benefits, all of which are important aspects of growth and development throughout adolescence (Stylianou et al., 2016). Physical activity coupled with the knowledge of brain functions may help educators become more effective when planning educational opportunities. The benefits of regular physical activity include weight management, improved sleep quality, lower blood pressure, stronger bones and muscles, increased heart and brain health, improved balance and coordination, and a decreased risk of developing certain types of cancer (CDC, 2021). Movement is needed for optimal learning because the brain is a complicated organ that drives the entire body. Physical activity in the classroom has proven to be an effective practice, and numerous teachers participate in it with little to no professional development (Dunn et. al, 2012). Programs such as Brain Gym and YouTube provide teachers with an unlimited platform for physical brain break ideas. Some teachers have taken the time to create their physical brain breaks based on their students and their research practices. Participating educators implementing brain breaks during Baker et al.'s (2017) study noted they understood the

connection between physical activity and improved academics. Teachers often consider content over brain functions when preparing to instruct their students, and this may be a barrier for teachers considering implementing physical brain breaks in a middle school class. Questions for educators and educational neuroscientists to answer are (a) how the brain works and (b) how to develop instructional practices that are scientifically valid and confirmed to enhance learning (Boyles, 2014). Research has indicated student achievement is impacted by teacher knowledge and perceptions about educational neuroscience, professional development and classroom strategies used, and curriculum choices (Zadina, 2015). Numerous factors are to be considered before a teacher implements a new practice including time, knowledge, class size, and administrator approval. This study examined teachers' perspectives on the implementation of physical brain breaks in core classes.

Research Questions

1. What are middle school teachers' perceptions of brain-based learning, and how do these perceptions impact classroom management strategies?
2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom?
3. What themes exist among middle school teachers concerning physical brain breaks?

Research Design

A qualitative method design was used to collect information from interviews and surveys. I gathered the individuals' responses to questions about physical brain breaks

after deploying a survey asking teachers their views on what physical brain breaks are, how they can be used, and what they look like in motion. The research design allowed a better understanding of the participants' perceptions of physical brain breaks. The data from the surveys identified the teachers giving physical brain breaks versus those who do not, how often they give them, and their perceived outcomes. The surveys gave a snapshot of the participants along with their content area and the grade level they teach. This also gave me an idea of how many teachers understand what a physical brain break is and if they are employing them in their classes. Participants were invited to participate in the survey phase through school email, as seen in Appendix B. It was my goal to have 25% of the potential participant pool to participate in the survey phase. After completing the survey, participants were asked to click on a link on the survey submission page to provide contact information if they were interested in participating in the focus group.

Individuals who chose to participate in the focus group phase were asked for permission to be recorded, and they were informed their actual names would not be used once the data were published, as explained in the Informed Consent form in Appendix C. The participants had access to the data and had the right to remove themselves from the study. The data from the focus groups examined teachers' personal beliefs and choices and district expectations to understand how the perceptions of the teachers have guided them in implementing physical brain breaks or the lack thereof. The research also examined teachers' perspectives of physical brain breaks, no matter how small, and how they have impacted their students' engagement and behavior. Teachers' perceptions of classroom management and how it impacts their ability to implement physical brain breaks were explored. Focus group questions allowed participants the opportunity to

candidly share their opinions and concerns about teaching knowledge to describe their perceptions of physical brain breaks. Reasons for implementing brain breaks were discussed while also determining if the teachers had the same experiences with all of their classes. The direction of the focus group questions was guided using prior research. Participants had the option to respond to the questions in a recorded method. The interviews yielded qualitative data to better understand the participants' perspectives on physical brain breaks. Studies completed in a qualitative manner help a researcher to examine people's lives to see what people think about the outcomes of different possibilities (Yin, 2018). The purpose of this strategy of inquiry was to understand the relationship between teachers giving physical brain breaks and students' attentiveness in middle school classrooms. It also gave teachers an opportunity to express any changes they may see in their students' behaviors. At this stage in research, the relationship between physical brain breaks and teachers' seeing improvement in student achievement was defined as teachers using physical brain breaks to see increased attentiveness and an increase in achievement in the students they teach.

To help keep the results of the research from being tainted, due to the teaching relationship I have with some of the participants, I explored the possibility of retaining a trained interviewer for the focus group. Phase 2 participants agreed to meet at an opportune time for all who planned to partake in the discussion. Information obtained from the participants gave me a better understanding of the participants' perspectives on physical brain breaks along with the possible benefits and challenges.

After dissecting the data, I looked for themes associated with the research questions. I also looked for trends among the grade levels. Repeated words were noted in

relation to the questions being asked. Relationships among the main concepts were reviewed to better understand the perspectives being shared. After interviewing the participants, I had a clearer understanding of the teachers' views of physical brain breaks at middle schools located in the northwestern part of the state.

Participants

Participants were middle school teachers in a district in the northwestern part of North Carolina. Core classes include math, social studies, English language arts, and science. Teachers have not received formal training but implemented the practice while following the example set by a fellow teacher. Some teachers may have attended professional development on how to implement physical brain breaks while educating teachers about the importance of considering the brain's function when planning learning activities. Participants were asked to respond to questions on a survey using a Google Form. After submitting the survey, participants were asked to provide their contact information if they were interested in participating in the focus group discussion.

Data Analysis

Data were collected using two separate phases including surveys and a focus group. The first phase was the surveys, and the second phase was the focus group. Participants were invited using their district emails to participate in an online survey after reviewing and agreeing to the consent form.

Survey

The data from the survey have been analyzed for themes and common responses supplied by the participants. All survey questions are found in Appendix D. The survey was completed by participants in Grades 6-8, encompassing most of the content areas

including core and elective classes. The data from the survey show a minority of the participants actually give a physical brain break, while most do not and do not have a desire to learn more about them. There were 10 questions requiring a response. Some responses were open-ended, while others were selections made by the participants. Tables 2-11 provide the participants' responses to each question on the survey.

The first survey question was used to determine what grade or grades the participants self-reported. Teachers reported teaching sixth, seventh, or eighth grades, with some teaching all grade levels and some teaching two grade levels. Table 2 shows the participants' responses indicating what grade level or levels they taught.

Table 2

Participant Responses to Survey Question 1

Survey Question 1. What grade(s) do you teach?
All
7th
7th and 8th
6th grade
6-8
6th, 7th, and 8th grade special education
6th
6
7th grade
7th grade
8th
7th
6-8
6-8
7th grade
6-8th
6
7th grade
7
6-8
8
6, 7, 8
6-8
8
6
6
6
8
6, 7, 8
6
7
7 and 8
6-7
6-8
8th
7
6-8

(continued)

Survey Question 1. What grade(s) do you teach?
Eighth
6-8
7
All
7
6-8
All
8
7
6-8
6-8
6, 7, 8
6-8
6-8

Survey Question 1 was open-ended, giving participants the opportunity to indicate their grade level, or grade levels, as they prefer.

Table 3 represents the content areas being taught by the participants responding to the survey.

Table 3

Survey Question 2 Participant Responses

Survey Question 2. What subject(s) do you teach?	
Advanced math	1
Art	1
Band	1
Bible	1
ca	1
Chorus	1
CTE	1
EC	1
EC self-cont.	1
ELA	4
ELA/SS	1
English and math	1
Espanol	1
Exceptional children	1
Health/PE	1
ISS	1
Math	7
Math 6	1
math and prealgebra	1
Math, science, social studies, ELA	1
Mathematics	1
PE	1
Physical education	1
Physical education and health	1
Reading	1
Reading and math	1
Resource math $7^{th}/8^{th}$ grade; inclusion in English and math classes	1
Science	6
Science and math	1
Social studies	2
Spanish	1
SS	1
SS/ELA	1
STEM	1
World language	1
Grand total	51

Table 3 shows the content areas being represented with some participants representing two or more content areas. Survey Question 2 was open-ended, giving participants the opportunity to indicate their content area, as they prefer.

Table 4 indicates if the participants give their students an opportunity to take a break from learning and working in class.

Table 4

Participant Responses to Survey Question 3

Survey Question 3. In class, do you give your students an opportunity to take a break from work and learning?	Number of responses
Yes	37
No	14
Total	51

Table 4 shows most of the participants do give their students an opportunity to take a break from learning and working, while 10.50% do not give breaks. Participants were given an opportunity later in the survey to explain why they do not take breaks from learning.

Table 5 represents the participants' responses to if they do or do not give physical brain breaks in their classroom.

Table 5

Participant Responses to Survey Question 4

Survey Question 4. In class, do you give physical brain breaks as is in giving students a break from work and learning while participating in some type of movement?	Number of responses
Yes	22
No	29
Total	51

Table 5 shows most of the participants do give their students an opportunity to

take a physical break from learning and working, while approximately 43% do not give breaks. When compared to Survey Question 3, fewer participants give their students an opportunity to participate in movement during breaks from work and learning.

Table 6 represents the participants' responses to how long their physical brain breaks last if it applies to them.

Table 6

Participant Responses to Survey Question 5

Survey Question 5. In total, how long does your physical brain break(s) last?	Number of responses
0-30 Seconds	1
30-60 Seconds	4
1-3 Minutes	6
3-5 Minutes	11
5 or more minutes	7
N/A	22
Total	51

While the majority of the participants report as not applicable, many participants give brain breaks lasting 3-5 minutes, with others followed by almost 12% giving brain breaks for 1-3 minutes.

Table 7 displays the participants' responses to if they give the same physical brain breaks daily.

Table 7

Participant Responses to Survey Question 6

Survey Question 6. Do you give the same physical brain breaks daily?	Number of responses
Yes	11
No	25
N/A	15
Total	51

Data from Survey Question 6 indicates most participants do not offer the same physical brain breaks, while almost 30% indicated this did not apply to them and almost 22% indicated they offer the same physical brain break daily.

Table 8 represents the participants' opinions of students benefiting from physical brain breaks in a yes or no response.

Table 8

Participant Responses to Survey Question 7

Survey Question 7. Do you think students benefit from physical brain breaks?	Number of responses
Yes	48
No	3
Total	51

Table 8 shows most of the participants do believe students benefit from physical brain breaks with 94% responding yes and about 6% responding no.

Table 9 represents the open-ended responses to Survey Question 8 asking what challenges the participants have experienced giving a physical brain break.

Table 9

Participant Responses to Survey Question 8

Survey Question 8. What challenges do you experience giving physical brain breaks? Participant responses
Behavior
Behavior problems if students are not engaged
Depends on the day
Don’t give
Getting student's attention back to learning and work.
Getting them refocused
I don't give them
I don’t give them
I was forced to participate in a week-long workshop on brain breaks, 17 years ago. Millions of $$ spent on research and marketing. The whole week I sat there and wondered why I wasn’t getting paid the $$…The best brain breaks: RECESS for K-8-more than one; more than a 25-minute sit down lunch.
Keeping middle students under control and able to return to class work.
Lack of focus and discipline
Lack of time due to curriculum restraints
n/a
n/a
Nine
None
Not wanting to return to work
Off task
(continued)
Off task behaviors
Off task, loss time
One challenge is when the scheduled brain break happens to fall during a group discussion and students remind you of the break. Often I don't want to break due to those teachable moments. However, students will remind you. Another challenge has been finding brain breaks, other than taking a walk or just allowing students time to talk, that all students appreciate and actively participate.
Participation but I also haven't developed them much yet since I just finished my first year of teaching last year.
Refocus
Refocusing
Returning to task quietly
Returning to their work quietly
Returning to work

Survey Question 8. What challenges do you experience giving physical brain breaks? Participant responses
Some students are hesitant to participate when they do not see their peers participating.
Space
Students roaming around the room or excessive talking
Students want them to last longer
Talkative
Talking, structure
They last longer than they should.
Time management
Time, sometimes other activities take longer than expected and therefore plans get adjusted.
(continued)
Time! Trying to fit it in while still getting all standards covered.
Too little time
Too much talking

Table 9 indicates some of the reported challenges including lack of time, the loss of structure, and students becoming talkative. The survey question was open-ended, giving participants the opportunity to indicate their personal experiences.

Table 10 represents the participants' responses about what prevents them from giving physical brain breaks.

Table 10

Participant Responses to Survey Question 9

Survey Question 9. What prevents you from giving physical brain breaks? Participant responses
At the mercy of lead teacher
Behavior
Behavior, assistance, moods
Class is short
Covering info
No time
Difficulty getting student back on task
Falling behind the pace guide and interruptions during class
Having enough time.
If we are in the middle of an activity, if something alters the schedule or decreases class time, if students misbehave in the future during the break I might have to cancel it for the whole class or figure something out just for those students.
Interruptions that take away from instruction
Lack of participation from students
Loss of time
n/a
No need
No space
Not enough time. Not all students participate. I forget. I need more ideas for brain breaks.
Not much time
Only have students 45 minutes
PE
Personal choice
Physical brain breaks overall are successful for students however sometimes students have a hard time regrouping and focusing back on instructions/assignments.
Punishment
Shortened class time or days tests are given
So much to teach
Sometimes student behavior may play a role in limiting physical brain breaks.
Sometimes, there have been schoolwide schedule changes or outside announcements/schoolwide assemblies have interrupted the typical class schedule.
Student behavior that interrupts instruction
Testing, schedule change
Tests

(continued)

Survey Question 9. What prevents you from giving physical brain breaks? Participant responses
The amount of time it takes to refocus the class.
Time
Time
Time! Trying to fit it in while still getting all standards covered.
When time does not permit.

Table 10 shows the challenges reported by participants who have given physical brain breaks. The survey question was open-ended, giving participants the opportunity to record answers based on their personal experiences.

Table 11 provides the number of participants responding either yes or no about wanting to learn more about physical brain breaks.

Table 11

Participant Responses to Survey Question 10

Survey Question 10. Would you like to learn more about physical brain breaks?	Number of responses
Yes	23
No	28
Total	51

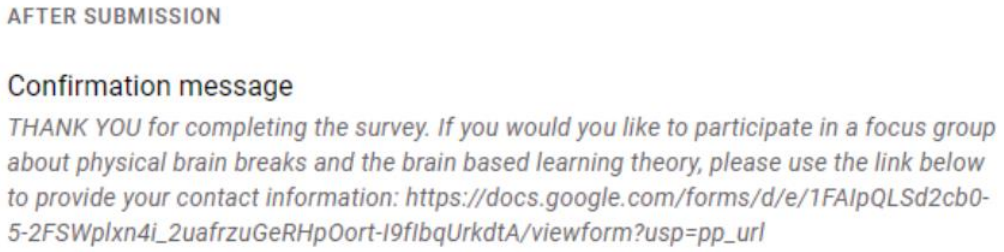
Table 11 shows the majority of the participants would not like to learn more about physical brain breaks. Survey participants did not have the option to explain why they would or would not like to learn more about physical brain breaks.

Focus Group

Teachers interested in participating in a focus group were prompted to complete a Google Form after completing the survey to share their interests. Figure 2 shows the message teachers received after completing the survey.

Figure 2

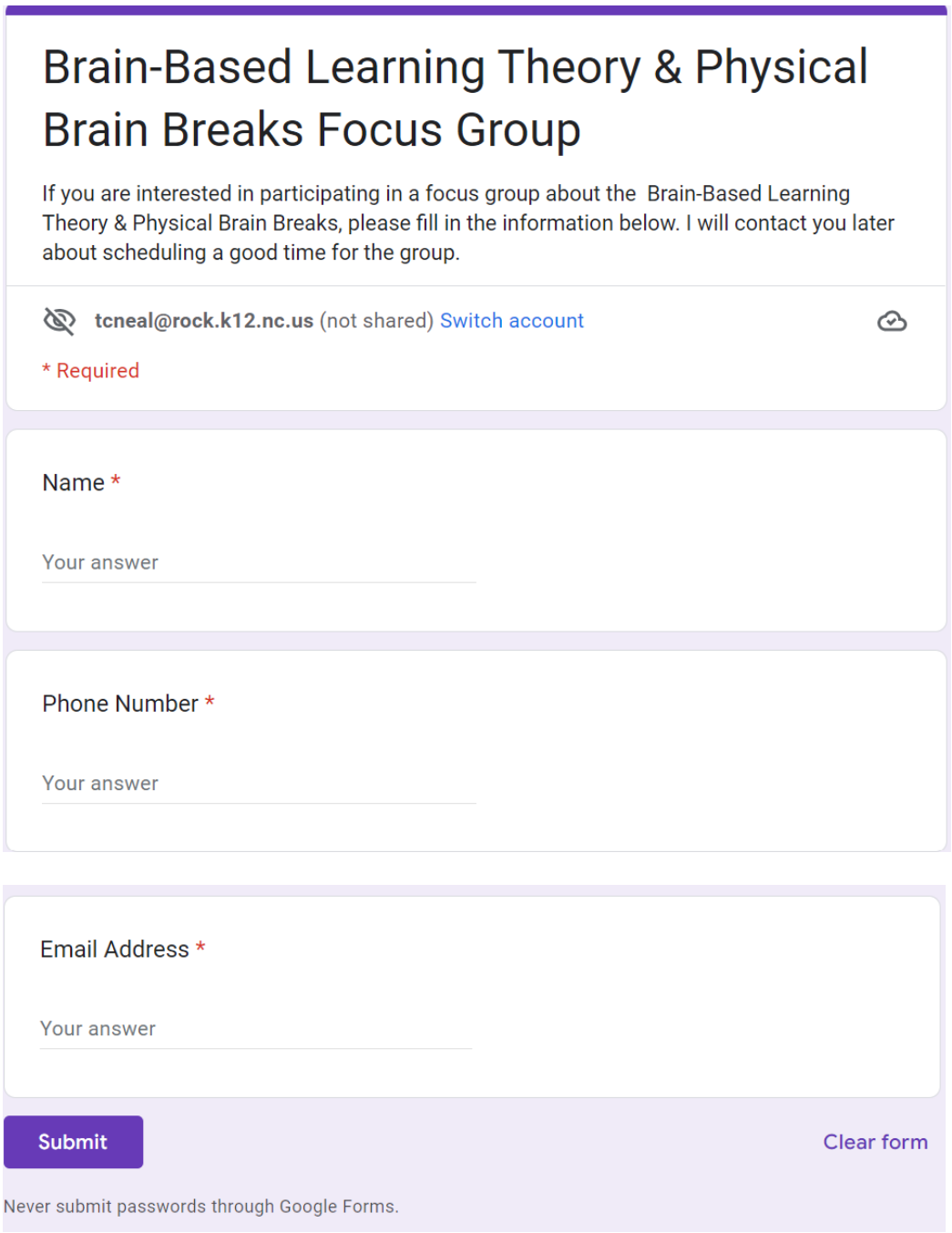
Confirmation Message



If survey takers decided to participate in the focus group, they were asked to share their contact information using the Google Form in Figure 3. The form asked for their name, phone number, and email address for communication purposes of planning to meet to discuss the focus group questions.

Figure 3

Focus Group Participant Information



Brain-Based Learning Theory & Physical Brain Breaks Focus Group

If you are interested in participating in a focus group about the Brain-Based Learning Theory & Physical Brain Breaks, please fill in the information below. I will contact you later about scheduling a good time for the group.

tcneal@rock.k12.nc.us (not shared) Switch account

* Required

Name *

Your answer

Phone Number *

Your answer

Email Address *

Your answer

Submit

Clear form

Never submit passwords through Google Forms.

During the focus group, participants were given the option to share as much as they wanted to, or they had the option not to respond. During the focus group, participants' responses were recorded to be transcribed at a later time. Table 12 gives the participants' responses to the 10 focus group questions. Some participants responded to the questions initially, while others did not. Other participants would chime in once other

participants had responded.

Table 12

Focus Group Questions and Participant Responses

Focus group questions	Participant responses
1. Describe a physical brain break.	-"I would say a physical brain break is where you give students a break from work where you encourage them to get up and move around." -"A physical brain break definitely requires some type of movement." -"It's just a chance to give them some physical movement to get that blood, the blood pumping through the body instead of just sitting."
2. How long do physical brain breaks last?	-"1 minute" -"1-2 minutes" -"1-5 minutes" -"5-7 minutes for a ninety-minute class" -"Depends on the planned lesson" -"5 minutes" -"10 minutes because I had the same students for 4 hours straight"
3. Do physical brain breaks have an impact on classroom management?	-"I personally do." -"I definitely have more engagement I feel like." -"They knew I had systems in place that they knew how to get back on task." -"That was part of the negotiating of the break breaks with them and having them buy into them was that we're going to take these breaks, but you have to be able to get back on track." -"We would practice that, you know, at the beginning of the year." -"They look at those brain breaks as kind of a treat." -"When kids feel like they are being rewarded with something they pretty much will do whatever you ask them to do if they know they've."
4. Does classroom management affect a teacher's ability to implement physical brain breaks?	-"A shift in not only classroom management, but student engagement." -"I think they make classroom management a little bit easier." -"If they enjoy what they're doing, they're more likely to do the other things as well." -"I think any type of physical movement throughout a class definitely helps classroom management." -"They seem to engage in what you want them to do a little bit better." -"I think it helps with focus, as another person said earlier on, with that movement of the blood and the bodies." -"Lots of middle schoolers are fidgety, so I feel like it helps get out a little bit of energy so that they can focus, which is a huge part of classroom management." -"If you allow some minor talking during the physical brain break, I feel like that cuts down on when they try to talk to each other." -"Which is another big part of classroom management, if they have a chance to talk, you know, completely on whatever topic they want during that five to whatever minutes it I feel like it does help."

(continued)

Focus group questions	Participant responses
	-“Then you can be like, look, that's your time.”
5. Do you think it is important for educators to consider students’ brain functions prior to planning instruction?	-“Absolutely.” -“Developmentally that we need to be thinking in regards to our students and where their brains truly have developed up until this.” -“I think oftentimes, and I've been guilty myself of expecting them to think like little mini adults and respond like little mini adults and behave like little mini adults.” -“Developmentally, how long should we realistically expect them to be able to stay focused on a task and complete a task without having a break.” -“That's why I struggle so when we do our end of grade tests because I'm like, this is such an unrealistic setting that we are putting these children in.” -“Then making them sit for all that time with no break and to complete an assessment.” -“So I do think as far as instructional planning, that's key and it can be a very natural thing to do.” -“Instructions should always be made in developmental skills of your students instead of your lesson should focus exactly what they're capable of and what works best for them.” -“When you plan, your physical brain breaks that, you may need to plan them based on the type of students and the developmental skills of those students that you.” -“You can't just have doing the same thing for a whole hour and a half and it has to be broken up and she wasn't even referring to.
6. How do you think physical brain breaks impact students? (In what ways do you think physical brain breaks impact students)	-“What I've seen over the years has just been definitely, uh, a positive impact.” -“I can honestly say I've not seen any negative impacts from the brain breaks.” -“Students adapt really well to change even throughout the lesson” -“Students kind of dictate that depending on their particular responses or their needs for that day” -“Student engagement”. -“I can't speak enough about the change that I did see in student engagement, and I was able to become truly more of a facilitator of learning Because the students were more engaged when I started using the brain breaks.” -“It wasn't pulling teeth any longer to get them to respond.” -“Definitely engagement, focus, I think even mood and like relationship with students because you could use that time To chat or even be potentially more silly than you could during a structured time.” -“I really enjoy that sort of thing with my students, so I think it increases like the community of the room, the trust.” -“Just a challenge too.” -“How do I get them back to focus?”
7. How can physical brain breaks impact teachers?	-“Helps us keep our sanity.” -“Relationship building.”

(continued)

Focus group questions	Participant responses
	-“When I feel like when kids see us in a light that we become kind of like normal, just like they are, it only helps that whole classroom culture, too. -“I think that was kind of spot on when it's or was speaking about the relation, the time, you know that you spend building relationships even in those few moments like that during your block time.” -“I actually take that time to stretch.” -“It also gives you a structured time to transition that you can't really take that time to do if you're trying to.” -“Helps me focus.” -“It helps me feel prepared.” -“Less anxiety.”
8. What challenges may educators experience when implementing physical brain breaks?	-“The biggest challenge is getting them back.” -“Sometimes that would probably be the biggest challenge is just getting them.” -“I think 2 like the pressure of our curriculum” -“Feeling like I can't squeeze another 5 minutes of anything in this block of time.” -“I've lightened up as the years have gone on.” -“The fear of trying something new.” -“Overwhelmed, like, again.” -“I think there might be a fear of what if admin or central office comes in right when we're doing that break and they don't approve or they don't they didn't know ahead of time or whatever.” -“How can I discipline?” -“No participation”
9. What benefits may educators experience when implementing physical brain breaks?	-“Daily classroom activities.” -“A life skill” -“A positive impact on your Wellness.” -“I'm more productive.” -“Maybe evolving their idea about your class or about school in general.” -“Maybe they'll feel more safe in your class just because you give them time where they don't have to feel like pressure to do something.” -“It could also make sure that they don't feel dread coming to school.” -“General climate” -“Making kids more excited to be there, as we talked about focus.”
10. Do you believe you are incorporating brain-based learning theory into educational practices when giving students physical brain breaks? Why?	-“I couldn't tell you what it is.” -“I don't know what that is. -“I think that theory has permeated through my education of, hey, you should have them get up and move, blood movement, blah Dee blah, but no, to answer your question. -“When I started utilizing them, it really it wasn't because there was the science behind it and that I understood the science behind it. -“As I've been teaching, just my practices are just ever changing, and that's what teaching is. So, you know, I'm getting ready to

(continued)

Focus group questions	Participant responses
	start my 21st, excuse me, 22nd year of teaching. And I definitely don't teach the same way that I did, you know, even 15 years ago, so." -"I truly just started brain breaks because, hey, I needed some way to motivate kids, and that's kind of where it all started."

Teachers were able to speak candidly when responding to the questions and when responding to one another. The opportunity to examine teachers' experiences may help the neurological field find a way to collaborate with educators to help minimize the gap between the two fields to help improve educational opportunities.

Emerging Themes: Focus Group

The theme emerging from the focus group data is relationships. As seen in some of the documented responses, many of the teachers use physical brain breaks to build positive connections with their students, while others may be fearful to implement physical brain breaks in their classrooms due to the lack of a relationship with the administration or central office. When teachers are not sure how a newly implemented concept is put into practice in the classroom, they may be reluctant to participate in it.

Teachers taking time to participate in a physical brain break with their students shared they feel students could look at them in a unique way, creating a platform for students to address the teacher without an audience. During the focus group, many of the teachers shared how important it was for the students to be able to address them one-on-one, as it helped with whole class student buy-in, classroom management, and student engagement.

The lack of relationships between teachers and administration may contribute to teachers' apprehensions about trying new concepts such as physical brain breaks. As seen in the surveys, some teachers do not have a desire to implement new concepts because

they may feel the district or administration is only concerned with the curriculum and ways to improve student success. Favorable relationships between teachers and educational stakeholders could improve student achievement, as teachers are willing to go beyond when they feel they are supported.

Addressing Research Questions

Research questions helped to structure the study, as they provided a platform for other questions to be developed. To ensure the teachers' perspectives were understood, the research questions were used to structure questions for the survey and focus group. Table 13 addresses how each survey and focus group question addresses the research questions.

Table 13

Research Question Alignment With Survey and Focus Group Questions

	Research Question 1	Research Question 2	Research Question 3
Survey questions	3, 4, 7, 10	3, 4, 6-9	1-10
Focus group questions	3, 4, 5, 6	1, 8, 9	1-10

Research Question 1. What are middle school teachers' perceptions of brain-based learning, and how do these perceptions impact classroom management strategies? This question was addressed in both the survey and the focus group. The purpose of this question was to better understand how middle school teachers perceive brain-based learning and how it impacts classroom management strategies. Responses to the survey questions show teachers are not interested in learning more about brain-based learning. All but one participant in the focus group who participated in physical brain

breaks did not understand the relationship between brain-based learning and physical brain breaks. The participants did not have a desire to learn more about the brain-based learning theory but could see the correlation between brain breaks and the actual theory. Most participants in the focus group shared that they experienced better classroom management and engagement when students had the opportunity to participate in some type of break from learning.

Research Question 2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom? The survey and focus group explored this question by giving participants the opportunity to share their experiences, benefits, and challenges associated with implementing physical brain breaks. The information obtained from the participants in the focus group and survey shows there is a relationship between teachers' perceptions of brain breaks and their use of them in their classrooms. While some participants indicated a negative experience or numerous reasons for not using them, other participants shared positive benefits of implementing physical brain breaks, which have helped their students' engagement and success in the classroom.

Research Question 3. What themes exist among middle school teachers concerning physical brain breaks? Numerous themes presented themselves as the data were evaluated. Participants were reluctant to implement physical brain breaks mostly due to the lack of time, knowledge, and relationship with the major stakeholders within their schools. Relationships among students and teachers was another major theme detected. Participants in the focus group discussed how important relationships were between students and teachers to maintain classroom management. The focus group and

survey questions gave participants the opportunity to share their opinions and perceptions about the brain-based learning theory and physical brain breaks. Table 14 examines some of the responses collected from the focus group and survey questions as they apply to the research questions and the major themes.

Table 14

Research Questions, Survey Data, Focus Group Responses, and Themes

Research questions	Survey results	Focus group responses	Themes
1. What are middle school teachers' perceptions of brain-based learning, and how do these perceptions impact classroom management strategies?	-Survey Question 3. Responses show most of the participants do give their students an opportunity to take a physical break from learning and working while about 32% percent do not give breaks. When compared to survey question three, less participants give their students an opportunity to participate in movement during breaks from work and learning. Survey Question 4. Responses show most of the participants do give their students an opportunity to take a break from learning and working while 10.50% do not give breaks. Participants will be given an opportunity later in the survey to explain why they do not take breaks from learning. Survey Question 7. Shows most of the participants do believe students benefit from physical brain break with ninety-four percent responding yes and about six percent responding no. Survey Question 8. Shows the challenges reported by participants that have given physical brain breaks. Some of the reported challenges include lack of time, the loss of structure and	Focus Group Question 3 - "They knew I had systems in place that they knew how to get back on task." - "That was part of the negotiating of the break breaks with them and having them buy into them was that we're going to take these breaks, but you have to be able to get back on track." - "We would practice that, you know, at the beginning of the year." - "They look at those brain breaks as kind of a treat." - "When kids feel like they are being rewarded with something they pretty much will do whatever you ask them to do if they know they've." Focus Group Question 4 - "A shift in not only classroom management, but student engagement." - "I think they make classroom management a little bit easier." - "If they enjoy what they're doing, they're more likely to do the other things as well." - "I think any type of physical movement throughout a class definitely helps classroom management." - "They seem to engage in what you want them to do a little bit better."	Emerging themes with this question include relationships, structure, and time. The major theme presented from the survey questions was time and structure while the focus group was relationships.

(continued)

Research questions	Survey results	Focus group responses	Themes
	students becoming talkative	- “I think it helps with focus, as another person said earlier on, with that movement of the blood and the bodies.” - “Lots of middle schoolers are fidgety, so I feel like it helps get out a little bit of energy so that they can focus, which is a huge part of classroom management.” - “If you allow some minor talking during the physical brain break, I feel like that cuts down on when they try to talk to each other.” - “Which is another big part of classroom management, if they have a chance to talk, you know, completely on whatever topic they want during that five to whatever minutes it I feel like it does help.” - “Then you can be like, look, that's your time.” Focus Group Question 6 - “What I've seen over the years has just been definitely, a positive impact.” - “I can honestly say I've not seen any negative impacts from the brain breaks.” - “Students adapt really well to change even throughout the lesson” - “Students kind of dictate that depending on their particular responses or their needs for that day” - “Student engagement.” - “I can't speak enough about the change that I did see in student	(continued)

Research questions	Survey results	Focus group responses	Themes
		engagement, and I was able to become truly more of a facilitator of learning Because the students were more engaged when I started using the brain breaks." - "It wasn't pulling teeth any longer to get them to respond." - "Definitely engagement, focus, I think even mood and like relationship with students because you could use that time to chat or even be potentially sillier than you could during a structured time." - "I really enjoy that sort of thing with my students, so I think it increases like the community of the room, the trust."	
2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom?	Data from Survey Question 6 indicates most participants do not offer the same physical brain breaks while almost thirty percent indicated this was not applicable to them and almost twenty-two percent indicate they offer the same physical brain break daily. Survey Question 7. shows most of the participants do believe students benefit from physical brain break with ninety-four percent responding yes and about six percent responding no. Survey Question 8. shows the challenges reported by participants that have given physical brain breaks. Some of the reported challenges	Focus Group Question 1 -"I would say a physical brain break is where you give students a break from work where you encourage them to get up and move around." - "A physical brain break definitely requires some type of movement" - "It's just a chance to give them some physical movement to get that blood, the blood pumping through the body instead of just sitting." Focus Group Question 2 -"1 minute" -"1-2 minutes" -"1-5 minutes" -"5-7 minutes for a 90-minute class"	Themes from this research question include engagement, movement, and break

(continued)

Research questions	Survey results	Focus group responses	Themes
	include lack of time, the loss of structure and students becoming talkative Survey Question 9 shows the challenges reported by participants that have given physical brain breaks.	-"Depends on the planned lesson" -"5 minutes" -"10 minutes because I had the same students for 4 hours straight" Focus Group Question 8. - "The biggest challenge is getting them back." - "Sometimes that would probably be the biggest challenge is just getting them." - "I think 2 like the pressure of our curriculum" -"Feeling like I can't squeeze another 5 minutes of anything in this block of time." - "I've lightened up as the years have gone on." - "The fear of trying something new." -"Overwhelmed, like, again." - "I think there might be a fear of what if admin or central office comes in right when we're doing that break and they don't approve or they don't they didn't know ahead of time or whatever." - "How can I discipline?" - "No participation" Focus Group Question 9 - "Daily classroom activities." - "A life skill" - "A positive impact on your Wellness." - "I'm more productive." - "Maybe evolving their idea about your class or about school in	(continued)

Research questions	Survey results	Focus group responses	Themes
		general." - "They'll feel more safe in your class just because you give them time where they don't have to feel like pressure to do something." - "It could also make sure that they don't feel dread coming to school." - "General climate" - "Improving that, making kids more excited to be there, as we talked about focus."	
3. What themes exist among middle school teachers concerning physical brain breaks?	All survey participants' responses presented themes.	All focus group participants' responses provided themes.	The themes existing among middle school teachers concerning physical brain breaks include student engagement, movement, classroom management, and relationships.

Relationships can be the most influential theme of this study as it allows for the correct implementation of any new strategy. The relationship between neurologists and educational stakeholders needs to be built to help the continued enhancement of learning opportunities for students at any educational level. The relationship between the district and teachers will need to be established to ensure the appropriate implementation at all middle schools if the district decides to move in that direction. Relationships between teachers and students would have the biggest impact because teachers will have to get the students to buy into taking effective physical brain breaks along with the ability to maintain classroom management, which comes from relationships within the classroom. Focus group questions allowed participants to go more in depth about their perceptions based on their personal experiences. Table 14 provides details about the themes as they

relate to the research questions and participant responses to the survey and focus group. Relationships was the most noted theme from the analysis of the data collected in the two phases.

Trustworthiness

The surveys and focus groups conducted helped to obtain credibility of the information obtained while completing the research. Based on the results of the research, there was enough participation to determine teachers' perspectives on brain-based learning and their use of physical brain breaks as it relates to classroom management. Other districts may replicate the study; however, they should not transfer the data from this study to their district. Other districts should allow teachers to share their opinions through surveys to determine their perspectives on brain-based learning and physical brain breaks as a classroom management strategy.

Summary

Data in this chapter were collected from participants in the focus group and collected surveys. The data have been analyzed by referencing the three research questions used to structure the study. In addition to written information, the data were also presented using tables and explanations of the participants' responses. The 10-question survey was sent to 155 middle school teachers in a district in the northwestern part of North Carolina with 51 teachers completing the survey. After participants completed the survey, they were asked to share if they would participate in a focus group later. Five individuals shared their desire to participate. Participants in the focus group were asked to share their responses to 10 questions but were not required to. The participants' responses helped to determine multiple themes associated with middle

school teachers' perspectives of brain-based learning and using physical brain breaks as a classroom management strategy. Using the data discussed in Chapter 4, recommendations and implications are discussed in Chapter 5.

Chapter 5: Discussion

The purpose of this study was to better understand teachers' perceptions of the benefits and challenges of implementing physical brain breaks in middle school classrooms. The brain-based learning theory is a scientifically driven theory in which educators prioritize the brain functions as the driving force when planning the curriculum (Umar et al., 2012). Brain-based learning is defined by neuroscientists as learning in correlation to the brain (Degen, 2014). Middle school students sit in classes for 80 minutes three times a day for language arts, math, and social studies, while being in elective classes such as physical education, Bible, technology, or Spanish for 45 minutes. While in school, students are expected to focus on the information being presented without being disrupted or being a disruption. Teachers are expected to impart content to students with the hope that they will show mastery when being assessed at the state and local levels. The problem plaguing teachers is ways to keep the students engaged with minimal classroom disruption, and for some teachers, 90 minutes just is not enough time to cover the material prescribed by the district's pacing guide. During class, students are expected to stay seated at their desks, be attentive, and indulge in opportunities to show their understanding of the material being taught by the teacher. Previous research shows that the brain-based learning theory is more effective than traditional teaching methods, including memorization, seated learning, and rote (Martin, 2015). Coupling the brain-based learning theory with current instructional practices gives students more opportunities to experience an optimized learning atmosphere due to the stimulation of their senses and emotions, which helps to engage students (Saleh & Aziz, 2012).

To better understand teachers' perspectives of the brain-based learning theory and

implementing physical brain breaks, the following questions were used to guide survey and focus group questions:

1. What are middle school teachers' perceptions of brain-based learning, and how do these perceptions impact classroom management strategies?
2. What relationship, if any, exists between middle school teachers' perceptions of physical brain breaks and their emphasis on implementation in the classroom?
3. What themes exist among middle school teachers concerning physical brain breaks?

Data were collected using two separate phases including surveys and a focus group. The first phase was the surveys, and the second phase was the focus group. Participants were invited using their district emails to participate in an online survey after reviewing and agreeing to the consent form.

Chapter 5 reviews the findings of the data collected from a survey and focus group discussion. The data are paralleled to the literature review completed in Chapter 2 along with an explanation of limitations and delimitations. The implication of brain-based learning and implementing physical brain breaks in the middle school classroom are discussed as well.

Summary of Findings and Supporting Theory

The purpose of this exploratory research study was to better understand middle school teachers' perspectives on brain-based learning and implementing physical brain breaks as a classroom management strategy. A platform is needed for educational stakeholders and neuroscientists to transition away from traditional pedagogy training to

providing professional development opportunities for teachers to learn more about brain-based learning (Busso & Pollack, 2014; Serpati & Loughan, 2012). The brain-based learning theory was used to present the conceptual framework of the information to be researched. This theory accentuates the need to use brain functions as the driving force when preparing to educate an individual. The brain is one of the most important organs of the body, and it serves as the command center for most organisms. Physical activity helps to improve the brain's functions, as the oxygen produced from movement helps to revitalize the amygdala and improves the passage of information to the prefrontal cortex (Willis, 2016). The participants of this research study noted improved student engagement and classroom management following the implementation of physical brain breaks. Participants giving brain breaks reported they lasted anywhere from 1 to 10 minutes depending on the amount of time they had with the students. One participant said she was expected to instruct the same students for a 4-hour block. Some students may lose focus 10 minutes into class, as their neurotransmitters may be depleted from information overload, anxiety, or social interests outside the classroom (Willis, 2016). Findings from this research support the idea that the brain should be considered in educational practices to ensure students are given an optimal chance to succeed in the classroom.

The use of neuroscience to inform educational stakeholders as they plan and develop curriculum is the use of the brain-based learning theory (Swan, 2019). Previous studies have shown educational stakeholders believe neurological findings further prove the significance of brain-based learning through thinking, sensory, and individual experiences (Serpati & Loughan, 2012). The brain-based learning theory consists of

several principles (Swan, 2019):

1. health and exercise
2. positive emotions
3. group work
4. peer teaching
5. practice
6. limited lectures
7. written and verbal information
8. stimulation
9. less stress

Educators may not be able to provide these components of brain-based learning daily. but with planning and understanding the possibility of improving students' learning environments, teachers may experience improved student engagement. While brain-based learning is new to the educational field, participants in this research study have adapted many of the principles unknowingly and are reaping the benefits of more student engagement and better classroom management strategies. Teaching students about the negative side effects of sedentary behaviors and ways to avoid them could be beneficial for students through academic achievement and lifelong lessons to carry into their future. Sedentary behavior has a negative impact on metabolic health and decreases overall brain health and cognitive functions (Voss et al., 2014). Student engagement increases with an increased heart rate (Darnell & Kreig, 2019). Professional development could be used to help teachers utilize instructional strategies using the brain as the focal point while improving teaching practices and students' educational opportunities (Edelenbosch et al.,

2015). During the focus group, only one participant responded as being knowledgeable about the brain-based learning theory. Oftentimes, best practices are being employed by educators without understanding the foundational components but responding to the positive effects it may have on their students.

Health and exercise are crucial factors in any individual's life because, without health, they would not be able to acquire the information needed to be successful. Focus group participants were asked how they felt following a physical brain break, and they responded with positive reactions such as feeling reenergized, awakened, and able to continue throughout the day. Participants also stated they noticed students were more attentive and engaged and appeared refreshed after their physical brain break. During their breaks, some participants spoke about their relationships growing with their students, and this also falls under other principles of brain-based learning including positive emotions, minimizing stress, and giving some stimulation in the class. For some, taking brain breaks allowed students to approach them one on one without an audience to discuss information they may have questions about or to share something personal with them. Researchers believe neuroscience should be introduced to school administrators to help equip their teachers with practices to better serve students (Dubinsky et al., 2013). This would also apply to one of the seven principles of the brain-based learning theory dealing with positive emotions and having the opportunity to socialize in a separate way than students normally would.

Implications for Practice

Implications of brain-based learning include the lack of studies, as this is a very new field and there is no conceivable way for scientists to conduct studies on students'

brains during learning in the middle school classroom. While current studies show positive effects of physical brain breaks, there are numerous factors to encompass to ensure the true benefit of implementing them. The survey data show most participants do not have a desire to learn more about brain-based learning, and higher educational institutions do not offer classes to inform teachers about the review of brain functions prior to planning instruction. Participants expressed a lack of interest in learning more about this information and may need to witness the implementation of physical brain breaks with challenges and benefits. One of the repeated self-reported reasons for not giving physical brain breaks was the amount of time. Standing is one of many ways to decrease sedentary behavior and proves to promote improved health (Wendel et al., 2016). Standing is a form of a physical brain break and could be easily implemented in a classroom without impeding instructional time or having to provide extra space. Other studies show standing increases student engagement, while walking also helps (Buman et al., 2013).

There is a disconnect between the classroom and the neuroscience lab, even though education serves as a starting place for the research needed to understand how one complements the other (Sigman et al., 2014). Administrators could be helpful with implementing a neurological perspective because they will attain the latest information that could be shared with teachers to better educate students by putting brain functions to the front when planning (Dubinsky et al., 2013). While there may be different perspectives between educational stakeholders and neuroscientists, this study can be used to support the significance of middle school teachers' perspectives in relation to the implementation of brain-based learning theory and how neuroscience plays a major role

in its application (Edelenbosch et al., 2015).

Educational methodologists may need to revisit and install new pedagogy for students as the brain is driving the functionality of the student. Brain-based instructional strategies have been found to improve the retention of knowledge, achievement, motivation, and attitude (Uzezi & Jonah, 2017). Survey participants indicated they were not interested in learning more about brain-based learning. Lack of interest in the opportunity to expand knowledge about this current trend may prove problematic because a lack of buy-in may not yield positive effects. However, if research opportunities were provided to those interested, they may be more likely to participate as requested.

Delimitations and Limitations of the Study

The most reported limitation of the study was time. Most survey participants noted they found the implementation of physical brain breaks challenging due to time constraints. Some participants noted there was a lack of time due to the overwhelming amount of information they had to cover within a class period. A quantitative study may be used to chart the amount of time it takes middle school students to regain focus after taking a physical brain break (Weslake & Christian, 2015).

Other limitations may include the weather may limit the student's ability to complete daily laps; however, there will be in-class activities using dice to indicate a physical brain break. Students with a physical handicap such as a broken leg, ankle, or toe may prevent them from participating in the brain break. Student and teacher absences may prevent physical brain breaks from taking place along with other factors such as lockdowns, fire drills, and the closure of schools.

Future Research

I would recommend the district investigate partnering with universities or colleges looking to learn more about the benefits of providing physical brain breaks at the middle school level. Students coming to the middle school level are used to having an organized time for physical brain breaks because of recess at the elementary school level. Physical brain breaks are a new concept needing further research to understand the connection between students' brain functions and effective instruction. Standing is one of many ways to decrease sedentary behavior and proves to promote improved health (Wendel et al., 2016). More research is needed to help bridge the gap between the educational system and neurological stakeholders. Neurologists and educators should collaborate to evaluate the best methods for educating students, specifically at the middle school level. While the dissemination of the brain may not be able to take place in a lab or through other scientific advancements, the collaboration between the two fields could help to serve students in the future.

Larger Participation

Further research may include the usage of student testing data or district-approved data sets from sources including IReady and Achieve. The stakeholders at the district, state, and federal levels often equate success with numbers. To help illustrate the true benefits of implementing physical brain breaks into a classroom, studies will need to prove the potential of success on testing data including EOGs. The research may include the possibility of paralleling the classrooms compared to those classrooms not implementing physical brain breaks. Teachers needing more training, observation of teachers implementing physical activity, and the credibility of physical brain breaks are

barriers (Goh et al., 2013). If the research performed shows physical brain breaks are beneficial with proof of student improvement through data moving in the desired direction, there may be a platform for the proper training of educators on the brain-based learning theory and the implementation of physical brain breaks. Another study shows a change in heart rate correlates with student engagement (Darnell & Kreig, 2019).

Focus on Training and Professional Development Opportunities

The application of brain-based learning has positive effects on students while benefiting teachers and improving students' academic abilities (Umar et al., 2012). Participants in the focus group indicated they were able to implement physical brain breaks without training or an understanding of the supporting theory. However, a platform is needed for educational stakeholders and neuroscientists to collaborate in an effort to have the educational field transition from the traditional approach to education to brain-based learning (Serpati & Loughan, 2012). Students who participated in an elementary study of physical activity being implemented into lessons showed improvement in reading and math (Erwin et al., 2013).

The findings of the survey show the participants believe brain breaks are beneficial to students; however, most do not want to learn more about physical brain breaks. Teachers with a lack of knowledge, training, and skills about brain-based learning may create a lack of motivation when implementing brain-based learning opportunities. Most of the literature surrounding this theory indicates the need for more data before determining how teachers perceive the implementation of brain-based learning in the classroom (Edelenbosch et al., 2015). While some teachers are consistently looking for best practices to improve their students, others may benefit from learning more about the

connection between cognitive activity and neuroscience to understand the benefits students may experience during the learning process when the brain's functions are used to drive instruction (Hook & Farah, 2013). When teachers are more comfortable with new activities and procedures, they are more likely to get the students to buy in (Dauenhauer et al., 2022).

Conclusion

Teachers have one job and that is to educate while also being bombarded with other demands including nursing, counseling, disciplining, and so many other responsibilities. While most focus group participants believe students should have some type of break, none of them were of the brain-based learning theory. Even not knowing about brain-based learning, teachers giving their students physical brain breaks reported benefits to include improved relationships with students, more student engagement, and improved feelings. During the focus group, participants reported positive benefits for themselves such as feeling refreshed and refocused on the ability to get their students to buy into the content they are covering. Teachers experiencing positive effects for themselves may share the benefits to help influence other teachers to implement those practices in their classrooms. Principals may see teachers working harder to get their students engaged because of the benefits of physical brain breaks. Building administrators may want to encourage teachers and staff to take time to walk around the campus or to get up and stretch to help them feel more energized during the day. This may lead to healthier lifestyles, less sickness, and a boost in school morale. Healthier individuals are more likely to contribute more to society than those who are not. Not only does movement help individuals physically but mentally as well. Examining student

perceptions of physical brain breaks could also help teachers to understand the benefits, and this would also give students an opportunity for ownership in understanding what tactics could be used to help them be more productive in the classroom. Educational stakeholders could take the same approach when introducing the idea of implementing physical brain breaks by having staff members take a moment to move or stretch during a meeting. When teachers receive formal training as students and professionals, there is not much emphasis put on the students' neurological connections to curriculum, classroom management, or factors to determine success for a student. During the 1990s, a new emphasis was placed on the study of the human brain. Since that time, studies have taken place to better understand the functions of the brain. With the study of the brain, a bridge was formed between the neurological and educational fields with limited research. While neurologists may not be able to complete MRIs in a classroom, strides are being made to better understand how teachers can implement practices to stimulate the brain's functioning to encourage maximum retention of the information being presented. In previous studies, teachers with a better understanding of the brain's functions were able to serve their students more effectively. The brain-based learning theory can be used to help teachers provide improved classroom instruction. Teachers with the knowledge of the brain's function can serve their students in new capacities by increasing student engagement and minimizing behaviors detrimental to the learning atmosphere. Sitting for extended periods of time, as many students do, has negative health effects, both long and short term. Students' needs differ and their needs include physical activities which play a direct role in how and when students learn (Markman & Duke, 2016).

References

Abi Nader, P., Hilberg, E., Schuna, J. M., John, D. H., & Gunter, K. B. (2019). Association of teacher-level factors with implementation of classroom-based physical activity breaks. J*ournal of School Health, 89*(6), 435–443.

Ackerman, A. L. (2018). *Relationship between movement and student behaviors* (Publication No. 91) [Master's thesis, Northwestern College]. NWCommons.

Anderson, L., Thompson, D. R., Oldridge, N., Zwisler, A. D., Rees, K., Martin, N., & Taylor, R. S. (2016). Exercise-based cardiac rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews, 2016*(1), Article CD001800.

Bailey, C. G., & DiPerna, J. C. (2015). Effects of classroom-based energizers on primary grade students' physical activity levels. *Physical Educator, 72*(3), 480-495.

Baker, C. L., Jara-Ettinger, J., Saxe, R., & Tenenbaum, J. B. (2017). Rational quantitative attribution of beliefs, desires and percepts in human mentalizing. *Nature Human Behaviour, 1*, Article 0064. https://doi.org/10.1038/s41562-017-0064

Bedard, C., St John, L., Bremer, E., Graham, J. D., & Cairney, J. A. (2019). Systematic review and meta-analysis on the effects of physically active classrooms on educational and enjoyment outcomes in school age children. *PLoS One, 14*(6), e0218633. https://doi.org/10.1371/journal.pone.0218633

Booth, M. Z., & Gerard, J. M. (2011). Self-esteem and academic achievement: A comparative study of adolescent students in England and the United States. *Compare*: *A Journal of Comparative and International Education, 41*(5), 629-648. https://doi.org/10.1080/03057925.2011.566688

Boyles, D. (2014). Brain matters: An argument for neuropragmatism and schooling. *Philosophy of Education Archive,* 403-411. https://educationjournal.web.illinois.edu/archive/index.php/pes/article/view/4036.pdf

Bull, F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., Carty, C., Chaput, J. P., Chastin, S., Chou, R., Dempsey, P. C., DiPietro, L., Ekelund, U., Firth, J., Friedenreich, C. M., Garcia, L., Gichu, M., Jago, R., Katzmarzyk, P. … & Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behavior. *British Journal of Sports Medicine, 54*(24),451-1462.

Buman, M. P., Winkler, E. A., Kurka, J. M., Hekler, E. B., Baldwin, C. M., Owen, N., Ainsworth, B. E., Healy, G. N., & Gardiner, P. A. (2013). Reallocating time to sleep, sedentary behaviors, or active behaviors: Associations with cardiovascular disease risk biomarkers, NHANES 2005–2006. *American Journal of Epidemiology*, *179*(3), 323–334. https://doi.org/10.1093/aje/kwt292

Bunketorp Käll, L., Malmgren, H., Olsson, E., Lindén, T., & Nilsson, M. (2015). Effects of a curricular physical activity intervention on children's school performance, wellness, and brain development. *The Journal of School Health, 85*(10), 704–713. https://doi.org/10.1111/josh.12303

Busso, D. S., & Pollack, C. (2014). No brain left behind: Consequences of neuroscience discourse for education. *Learning, Media and Technology, 40*(2), 1-19. https://doi.org/10.1080/17439884.2014.908908

Butler, B., & Cuenca, A. (2012). Conceptualizing the roles of mentor teachers during student teaching. *Action in Teacher Education, 34*(4), 296-308. https://doi.org/10.1080/01626620.2012.717012

Camahalan, F. M. G., & Ipock, A. R. (2014, November 30). *Physical activity breaks and student learning: A teacher-research project.* Education. https://eric.ed.gov/?id=EJ1095394

Centeio, E. E., Erwin, H., Howie, E. K., & Castelli, D. M. (2014). Comprehensive school physical activity programs: Characteristics of trained teachers. *Journal of Teaching in Physical Education, 33*(4), 492-510.

Centers for Disease Control and Prevention. (2018). *Strategies for classroom physical activity in schools.* Author.

Centers for Disease Control and Prevention. (2021, June 16). *Benefits of physical activity*. Author.

Chaddock-Heyman, L., Erickson, K. I., Voss, M. W., Knecht, A. M., Pontifex, M. B., Castelli, D. M., Hillman, C. H., & Kramer, A. F. (2013). The effects of physical activity on functional MRI activation associated with cognitive control in children: A randomized controlled intervention. *Frontiers in Human Neuroscience, 7*. https://doi.org/10.3389/fnhum.2013.00072

Chang, R., & Coward, F. L. (2015, October). More recess time, please! *Phi Delta Kappan International, 97*(3), 14–17, https://journals.sagepub.com/doi/abs/10.1177/0031721715614822

Chiang, M., Jain, S., & Liu, Z. (2014). Learning about social learning in MOOCs: From statistical analysis to generative model. *IEEE Transactions on Learning Technologies*, *7*(4), 346-359.

Cline, A., Knox, G., De Martin Silva, L., & Draper, S. (2021). A process evaluation of a UK classroom-based physical activity intervention—"busy brain breaks." *Children, 8*(2), 63.

Conner, L., & Sliwka, A. (2014). Implications of research on effective learning environments for initial teacher education. *European Journal of Education*, *49*(2), 165-177. https://doi.org/10.1111/ejed.12081

Corbin, L., & Bugden, L. (2018). Online teaching: The importance of pedagogy, place and presence in legal education. *Legal Education Review*, *28*, 1-21.

Darnell, D. K., & Krieg, P. A. (2019). Student engagement, assessed using heart rate, shows no reset following active learning sessions in lectures. *PLOS ONE*, *14*(12), e0225709. https://doi.org/10.1371/journal.pone.0225709

Dauenhauer, B., Kulinna, P., Marttinen, R., & Stellino, M. B. (2022). Before- and after-school physical activity: Programs and best practices. *Journal of Physical Education, Recreation & Dance*, *93*(5), 20-26. https://doi.org/10.1080/07303084.2022.2053474

Dean, A. C., Morales, A. M., Hellemann, G., & London, E. D. (2018). Cognitive deficit in methamphetamine users relative to childhood academic performance: Link to cortical thickness. *Neuropsychopharmacology*, *43*(8), 1745-1752.

Degen, R. (2014). Brain-based learning: The neurological findings about the human brain that every teacher should know to be effective. *Amity Global Business Review*, *9*(1), 15-23.

Dinkel, D., Schaffer, C., Snyder, K., & Lee, J. M. (2017). They just need to move: Teachers' perception of classroom physical activity breaks. *Teaching and Teacher Education, 63*(38), 186-195.

Dubinsky, J. M., Roehrig, G., & Varma, S. (2013). Infusing neuroscience into teacher PD. *Educational Researcher, 42*(6), 317-29. https://doi.org/10.3102/0013189X13499403

Dunn, L. L., Venturanza, J. A., Walsh, R. J., & Nonas, C. A. (2012). An observational evaluation of Move-To-Improve, a classroom-based physical activity program, New York City Schools, 2010. *Preventing Chronic Disease, 9*, 146.

Edelenbosch, R., Kupper, F., Krabbendam, L., & Broerse, J. W. (2015). Brain-based learning and educational neuroscience: Boundary work. *Mind, Brain & Education, 9*(1), 40-49. https://doi.org/10.1111/mbe.12066

Egger, F., Benzing, V., Conzelmann, A., & Schmidt, M. (2019). Boost your brain, while having a break! The effects of long-term cognitively engaging physical activity breaks on children's executive functions and academic achievement. *PloS ONE, 14*(3), e0212482.

Erwin, E. E., Beighle, A., Morgan, C. F., & Noland, M. (2011). Effect of a low-cost, teacher directed classroom intervention on elementary students' physical activity. *Journal of School Health, 81*(8), 455-461.

Erwin, H., Fedewa, A., & Ahn, S. (2013). Student academic performance outcomes of a classroom physical activity intervention: A pilot study. *International Electronic Journal of Elementary Education*, *5*(3), 109-124.

Fedewa, A. L., Fettrow, E., Erwin, H., Ahn, S., & Farook, M. (2018). Academic-based and aerobic-only movement breaks: Are there differential effects on physical activity and achievement? *Research Quarterly for Exercise and Sport*, *89*(2), 153–163. https://doi.org/10.1080/02701367.2018.1431602

Field, T., Beeson, E., & Jones, L. (2015). The new ABCs: A practitioner's guide to neuroscience-informed cognitive-behavior therapy. *Journal of Mental Health Counseling*, *37,* 206-220. https://doi.org/10.17744/1040-2861-37.3.206

Fuller, K., Karunaratne, N., Naidu, S., Exintaris, B., Short, S., Wolcott, M., Singleton, S., & White, P. (2018). Development of a self-report instrument for measuring in class student engagement reveals that pretending to engage is a significant unrecognized problem. *PLoS ONE, 13*(10) 1-22.

Gasiewski, J. A., Eagan, M. K., Garcia, G. A., Hurtado, S., & Chang, M. J. (2012). From gatekeeping to engagement: A multicontextual, mixed method study of student academic engagement in introductory STEM courses. *Research in Higher Education*, *53*(2), 229–261. https://doi.org/10.1007/s11162-011-9247-y

Geertsen, S. S., Thomas, R., Larsen, M. N., Dahn, I. M., Andersen, J. N., Krause-Jensen, M. (2016). Motor skills and exercise capacity are associated with objective measures of cognitive functions and academic performance in preadolescent children. *PLoS ONE, 11*(8), e0161960. https://doi.org/10.1371/journal.pone.0161960

Glapa, A., Grzesiak, J., Laudanska-Krzeminska, I., Chin, M. K., Edginton, C. R., Mok, M., & Bronikowski, M. (2018). The impact of brain breaks classroom-based physical activities on attitudes toward physical activity in polish school children in third to fifth grade. *International Journal of Environmental Research and Public Health*, *15*(2), 368. https://doi.org/10.3390/ijerph15020368

Godwin, K. E., Almeda, M. V., Seltman, H., Kai, S., Skerbetz, M. D., Baker, R. S., & Fisher, A. V. (2016). Off-task behavior in elementary school children. *Learning and Instruction, 44*(1),128–143. https://doi.org/10.1016/j.learninstruc.2016.04.003

Goh, T. L., Hannon, J. C., Newton, M., Webster, C., Podlog, L., & Pillow, W. (2013). I'll squeeze it in: Transforming preservice classroom teachers' perceptions toward movement integration in schools. *Action in Teacher Education, 35*(4), 286-300.

Gonchar, M. (February 14, 2014). *Do kids need recess?* New York Times. http://learning.blogs.nytimes.com/2014/02/14/do-kids-needrecess/?_php=true&_type=blogs&_r=0

Gözüyeşil, E., & Dikici, A. (2014). The effect of brain based learning on academic achievement: A Meta-analytical study. *Educational Sciences: Theory & Practice, 14*(2), 642-648.

Handayani, B. S., & Corebima, A.D. (2017). Model brain-based learning (BBL) and whole brain teaching (WBT) in learning. *International Journal of Science and Applied Science: Conference Series, 1*(2), 153-161. https://doi.org/10.20961/ijsascs.v1i2 .5142

Harrison, J. R., Vannest, K., Davis, J., & Reynolds, C. (2012). Common problem behaviors of children and adolescents in general education classrooms in the United States. *Journal of Emotional and Behavioral Disorders, 20*(1), 55–64. https://doi.org/10.1177/1063426611421157

Hillman, C. H., Pontifex, M. B., Castelli, D. M., Khan, N. A., Raine, L. B., Scudder, M. R., & Kamijo, K. (2014). Effects of the FITKids randomized controlled trial on executive control and brain function. *Pediatrics, 134*(4), e1063-e1071.

Hinton, G., Ding, L., Yu, D., Dahl, G., Mohamed, A., Jaitly, N., Senior, A., Vanhouck, V., Nguyen, P., Sainath, T., & Kingsbury, B. (2012). Deep neural networks for acoustic modeling in speech recognition: The shared views of four research groups. *IEEE Signal Processing Magazine*, *29*(6), 82-97.

Hohnen, B., & Murphy, T. (2016). The optimum context for learning; drawing on neuroscience to inform best practice in the classroom. https://www.semanticscholar.org/paper/The-optimum-context-for-learning-%3B-drawing-on-to-in-Hohnen-Murphy/61caa7572e800db1010b2e48f9b2f621398a4e86

Hook, C. J., & Farah, M. J. (2013). Neuroscience for educators: What are they seeking, and what are they finding? *Neuroethics, 6*(2), 331-341. https://doi.org/10.1007/s12152-012- 9159-3

Immordino-Yang, M. H., Christodoulou, J. A., & Singh, V. (2012). Rest is not idleness: Implications of the brain's default mode for human development and education. *Perspectives on Psychological Science, 7*(4), 352–364. https://doi.org/10.1177/1745691612447308

Jacobsen, R. H., Bjørnholt, B., Krassel, K. F., Nørgaard, E., Jakobsen, S., Flarup, L., Munch, L., Møller-Haastrup, T., Nielsen, M., & Nygaard, H. (2017). En længere og mere varieret skoledag - Implementerings- og effektundersøgelse. [A longer and more varied school day - Implementation and effect research]. København: KORA (Det Nationale Institut for Kommuners og Regioners Analyse og Forskning). https://pure.vive.dk/ws/files/2038798/11013_en-laengere-og-mere-varieret-skoledag_implementerings-og-effektundersoegelse.pdf

Jensen, E. (2015). *Principles of brain-based learning*. Jensen Learning. https://www.jensenlearning.com/what-is-brain-based-research/principles/

Jørgensen, H. T., Agergaard, S., Stylianou, M., & Troelsen, J. (2019). Diversity in teachers' approaches to movement integration: A qualitative study of lower secondary school teachers' perceptions of a state school reform involving daily physical activity. *European Physical Education Review, 26*(2), 429–447. https://doi.org/10.1177/1356336x19865567

Käll, L. B., Nilsson, M., & Lindén, T. (2014). The impact of a physical activity intervention program on academic achievement in a Swedish elementary school setting. *The Journal of School Health, 84*(8), 473–480. https://doi.org/10.1111/josh.12179

Kämppi, K., Asanti, R., Hirvensalo, M., Laine, K., Pönkkö, A., Romar, J. E., & Tammelin, T. (2013). A more pleasant and peaceful learning environment—School staff's experiences and views on promoting a physical activity based operating culture in school *LIKES Research Reports on Sport and Health, 269.*

Kantomaa, M. T., Stamatakis, E., Kankaanpää, A., Kaakinen, M., Rodriguez, A., Taanila, A., Ahonen, T., Järvelin, M. R., & Tammelin, T. (2013). Physical activity and obesity mediate the association between childhood motor function and adolescents' academic achievement. *Proceedings of the National Academy of Sciences of the United States of America, 110*(5), 1917–1922. https://doi.org/10.1073/pnas.1214574110

Kibbe, D. L., Hackett, J., Hurley, M., McFarland, A., Schubert, K. G., Schultz, A., & Harris, S. (2011). Ten years of TAKE 10!(®): Integrating physical activity with academic concepts in elementary school classrooms. *Preventive Medicine, 52*(Supp.1), S43–S50. https://doi.org/10.1016/j.ypmed.2011.01.025

Knudsen, L. S., Skovgaard, T., & Bredahl, T. V. G. (2021). “I like it”: Exploring teachers' motivation for using classroom-based physical activity in Danish public schools from a self-determination perspective. Results from a mixed methods study. *Teaching and Teacher Education: An International Journal of Research and Studies, 106,* 103439. https://doi.org/10.1016/j.tate.2021.103439

Kuan, G., Rizal, H., Hajar, M. S., Chin, M. K., & Mok, M. M. C. (2019). Bright sports, physical activity investments that work: Implementing brain breaks in Malaysian primary schools. *British Journal of Sports Medicine 2019, 53,* 905–906.

Kurt, S. (2021, February 21). *Constructivist learning theory*. Educational Technology.

Lee, J., Zhang, T., Zhang, X., Chu, T. L. (Alan), & Weiller-Abels, K. H. (2021). Preservice classroom teachers’ perspectives on a comprehensive school physical activity programme. *Health Education Journal*, *80*(2), 145–159.

Leustig, T. (2020, September 13). *A definition for classroom management*. Dyknow. https://www.dyknow.com/blog/a-definition-for-classroom-management/

Lopez, Y., Rechner, P., & Olson-Buchanan, J. (2015). Shaping ethical perceptions: An empirical assessment of the influence of business education, culture, and demographic factors. *Journal of Business Ethics, 60*(34), 341-358.

Lowry, P., Gaskin, J., Twyman, N., Hammer, B., & Roberts, T. (2013). Taking "fun and games" seriously: Proposing the hedonic-motivation system adoption model (HMSAM). *Journal of the Association for Information Systems, 14*(11), 617-671. https://doi.org/10.17705/1jais.00347

Markman, A. B., & Duke, R. A. (2016). *Brain briefs: Answers to the most (and least) pressing questions about your mind*. Sterling.

Martin, L. (2015). The promise of the maker movement for education. *Journal of Pre-College Engineering Education Research (J-PEER), 5*(1), Article 4.

Martin, R., & Murtagh, E. M. (2015). An intervention to improve the physical activity levels of children: Design and rationale of the “Active Classrooms” cluster randomized controlled trial. *Contemporary Clinical Trials*, *41*(1), 180-191.

McMullen, J., Kulinna, P., & Cothran, D. (2014). Physical activity opportunities during the school day: Classroom teachers’ perceptions of using activity breaks in the classroom. *Journal of Teaching in Physical Education, 33*(4), 511–527.

Mok, M. M. C., Chin, M.-K., Korcz, A., Popeska, B., Edginton, C. R., Uzunoz, F. S., Coetzee, D., Georgescu, L., Emeljanovas, A., Pasic, M., Balasekaran, G., Anderson, E., & Durstine, J. L. (2020). Brain breaks® physical activity solutions in the classroom and on attitudes toward physical activity: A randomized controlled trial among primary students from eight countries. *International Journal of Environmental Research and Public Health, 17*(5), 1666–1666.

Mullender-Wijnsma, M. J., Hartman, E., de Greeff, J. W., Bosker, R. J., Doolaard, S., & Visscher, C. (2015). Improving academic performance of school-age children by physical activity in the classroom: 1-Year program evaluation. *Journal of School Health, 85*(6), 365-371.

Owen, J. P., Baig, B., Abbo, C., & Baheretibeb, Y. (2016). Child and adolescent mental health in sub-Saharan Africa: A perspective from clinicians and researchers. *BJPsych International*, *13*(2), 45-47.

Owen, N. (2018). Too much sitting and too little exercise: Sedentary behavior and health. *Revista Brasileira De Atividade Física & Saúde*, *23*, 1–4. https://doi.org/10.12820/rbafs.23e0001

Partipilo, A., & Nillas, L. (2015). Brain breaks: An innovative tool to re-engage students. *John Wesley Powell Student Research Conference*. http://digitalcommons.iwu.edu/jwprc/2015/ESposters2/11

Pasquinelli, E. (2012). Neuromyths: Why do they exist and persist? *Mind, Brain, and Education*, *6*(2), 89–96. https://doi.org/10.1111/j.1751-228x.2012.01141.x

Pellegrini, A. D., & Bohn, C. M. (2005). The role of recess in children's cognitive performance and school adjustment. *Educational Researcher, 34*(1), 13–19.

Pellegrini, A. D., & Smith, P. K. (1998). Physical activity play: The nature and function of a neglected aspect of play. *Child Development, 69*(3), 577-598.

Perera, T., Frei, S., Frei, B., & Bobe, G. (2015). Promoting physical activity in elementary schools: Needs assessment and a pilot study of brain breaks. *Journal of Education and Practice, 6*(55), 55-64.

Phillips, H., Meister, B., Johns, R., Bears, S., & Hamm, J. (2016). Do classroom energizer breaks get students moving? *Journal of Physical Education, Recreation & Dance, 87*(8), 58-59.

Podnar, H., Novak, D., & Radman, I. (2018). Effects of a 5-minute classroom-based physical activity on on-task behaviour and physical activity levels. *Kinesiology, 50*(2), 251–259. https://doi.org/10.26582/k.50.2.17

Quin, J. (2012). *A case study on recognition of prior learning (RPL): Reflexive practice in continuing education for teacher development.* SAQA RPL Conference.

Reilly, K. (2017). Is recess important for kids or a waste of time? Here's what the research says. *Time* Magazine. http://time.com/4982061/recess-benefits-research-debate/

Reinke, W. M., Stormont, M., Herman, K. C., Puri, R., & Goel, N. (2011). Supporting children's mental health in schools: Teacher perceptions of needs, roles, and barriers. *School Psychology Quarterly, 26*(1), 1–13.

Remler, D. K., & Van Ryzin, G. G. (2011). *Research methods in practice: Strategies for description and causation.* Sage Publications, Inc.

Rosenkranz, R. R., Neuendorf, C. M., Rosenkranz, S. K., & Sauer, K. L. (2020). Just sit still and pay attention?—A commentary. *Journal of School Health, 90*(5), 345–348. https://doi.org/10.1111/josh.12881

Saleh, S., & Aziz, A. (2012). Teaching practices among secondary school teacher in Malaysia. *International Proceedings of Economic Development and Research, 47*(14), 63-67.

Salem, A. A. M. S. (2017). Engaging ESP students with brain-based learning for improved listening skills, vocabulary retention and motivation. *English language teaching, 10*(12), 182-195.

Serpati, L., & Loughan, A. R. (2012). Teacher perceptions of neuroeducation: A mixed methods survey of teachers in the United States. *Mind, Brain, and Education, 6*(3), 174-176. https://doi.org/10.1111/j.1751-228X.2012.01153.x

SHAPE America. (2017). *School recess gets a leg up with newly released resources: CDC and SHAPE America help schools make most of this critical part of school day.* Author. https://www.shapeamerica.org/pressroom/2017/shape-america-and-cdc-new-recess-materials.aspx

Sigman, M., Peña, M., Goldin, A. P., & Ribeiro, S. (2014). Neuroscience and education: Prime time to build the bridge. *Natural Neuroscience, 17*(4), 497-502. https://doi.org/10.1038/nn.3672

Sladkey, D. U. (2013). *Energizing brain breaks*. Sage Publications Inc.

Souers, K., & Hall, P. A. (2016). *Fostering resilient learners: Strategies for creating a trauma-sensitive classroom*. Hawker Brownlow Education.

Stubbs, B., Vancampfort, D., Smith, L., Rosenbaum, S., Schuch, F., & Firth, J. (2018). Physical activity and mental health. *The Lancet Psychiatry, 5*(11), 873.

Stylianou, M., Kulinna, P. H., & Naiman, T. (2016). "…because there's nobody who can just sit that long." *European Physical Education Review, 22*(3), 390–408.

Swan, M. (2019). *What is brain-based learning?* Classcraft. https://www.classcraft.com/blog/what-is-brain-based-learning/

Terada, Y. (2018, August 24). *The science behind student stress.* Edutopia.

Tokuhama-Espinosa, T. (2011). *Mind, brain, and education science: A comprehensive guide to the new brain-based teaching.* W.W. Norton & Company.

Tommerdahl, J. (2010). A model for bridging the gap between neuroscience and education. *Oxford Review of Education, 36*(1), 97-109. https://doi.org/10.1080/03054980903518936

Trambley, E. (2017). *Breaks in the elementary classroom and their effect on student behavior* (Publication No. 109) [Master's thesis, California State University, Monterey Bay]. Digital Commons. https://digitalcommons.csumb.edu/caps_thes_all/109

Tumynaitė, L., Miežienė, B., Mok, M. M. C., Chin, M. K., Putriūtė, V., Rupainienė, V., & Emeljanovas, A. (2014). Effects of intervention "hopsport brain breaks" program on physical fitness and sedentary behaviour in primary school. *Baltic Journal of Sport and Health Sciences, 3*(94), 57-66.

Umar, A., Jamsari, E. A., Kasan, H., Hassan, W. W., Basir, A., & Aziz, A. A. (2012). The challenges of producing Islamic scholars via Al-Azhar curriculum in religious schools in the Malaysian national education system. *Advances in Natural and Applied Sciences, 6*(7), 1036-1043.

Uzezi, J., & Jonah, K. (2017). Effectiveness of brain-based learning strategy on students' academic achievement, attitude, motivation and knowledge retention in electrochemistry. *Journal of Education, Society and Behavioural Science, 21*(3), 1-13. https://doi.org/10.9734/JESBS/2017/34266

Voss, M. W., Carr, L. J., Clark, R., & Weng, T. (2014). Revenge of the "sit" II: Does lifestyle impact neuronal and cognitive health through distinct mechanisms associated with sedentary behavior and physical activity? *Mental Health Physical Activity,7*(1), 9–24. https://doi.org/10.1016/j.mhpa.2014.01.001

Vyas, K., & Vashishtha, K. C. (2013). Effectiveness of teaching based on brain research with reference to academic achievement of secondary school students. *International Journal of Students Research in Technology & Management, 1*(4), 383-397.

Watson, A., Timperio, A., Brown, H., & Hesketh, K. D. (2019). Process evaluation of a classroom active break (ACTI-BREAK) program for improving academic-related and physical activity outcomes for students in Years 3 and 4. *BMC Public Health, 19*(633), 1-8.

Webster, C. A., Russ, L., Vazou, S., Goh, T. L., & Erwin, H. (2015). Integrating movement in academic classrooms: Understanding, applying and advancing the knowledge base. *Obesity Reviews, 16*(8), 691-701.

Wendel, M. L., Benden, M. E., Zhao, H., & Jeffrey, C. (2016). Stand-Biased versus seated classrooms and childhood obesity: A randomized experiment in Texas. *American Journal of Public Health*, *106*(10), 1849-1854. https://doi.org/10.2105/AJPH.2016.303323

Weslake, A., & Christian, B. J. (2015). Brain breaks: Help or hindrance? *TEACH COLLECTION of Christian Education*, *1*(1), 38-46. http://research.avondale.edu.au/teachcollection/vol1/iss1/4

Western Governors University. (2020, October 21). *What is constructivism?* Author. https://www.wgu.edu/blog/what-constructivism2005.html#close

Wiebelhaus, S., & Hanson, M. (2016). Effects of classroom-based physical activities on off-task behaviors and attention: Kindergarten case study. *The Qualitative Report*, *21*(8), 1380-1393. https://doi.org/10.46743/2160-3715/2016.2448

Willis, J. (2012, July 27). *A neurologist makes the case for teaching teachers about the brain*. Edutopia. https://www.edutopia.org/blog/neuroscience-higher-ed-judy-willis

Willis, J. (2016). *Using brain breaks to restore students' focus*. Edutopia. https://www.edutopia.org/article/brain-breaks-restore-student-focus-judy-willis

Wilson, A. N., Olds, T., Lushington, K., Petkov, J., & Dollman, J. (2016). The impact of 10-minute activity breaks outside the classroom on male students' on-task behaviour and sustained attention: A randomised crossover design. *Acta Paediatr*, *105*, e181-e188.

Wilson, D., & Conyers, M. (2016). *Teaching students to drive their brains: Metacognitive strategies, activities, and lesson ideas*. ASCD.

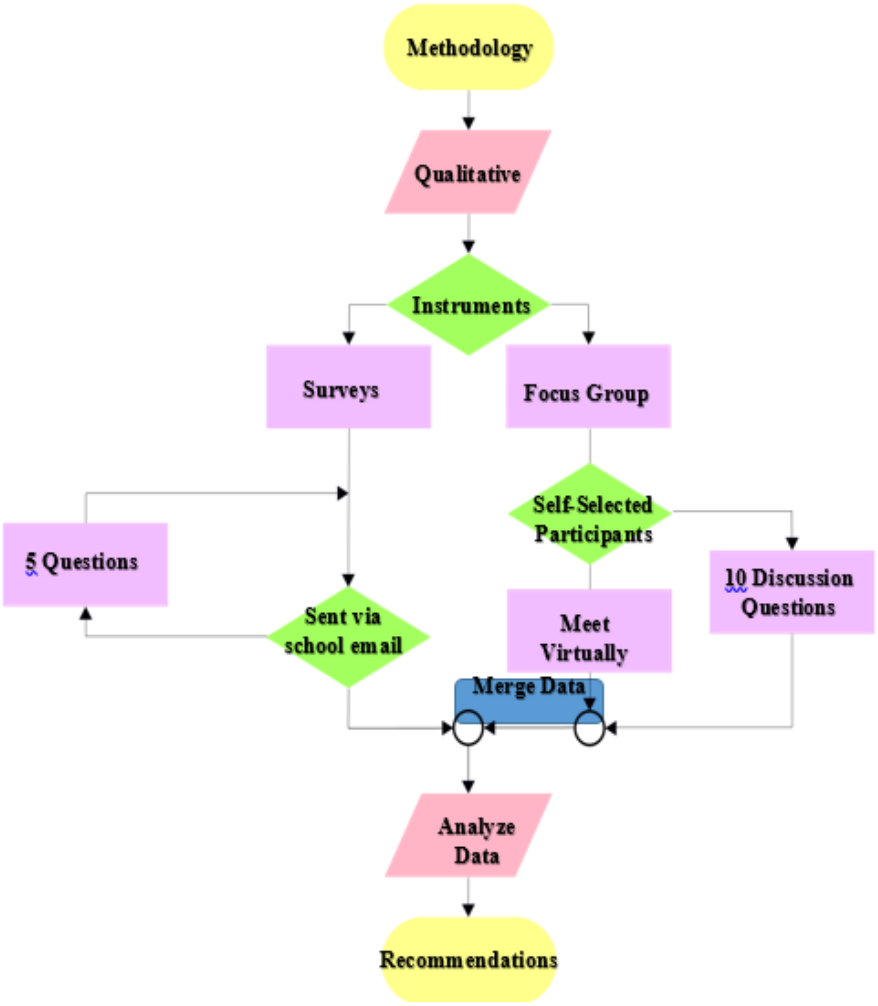
Wong, C. M., Wang, Y., Lee, J. T. H., Huang, Z., Wu, D., Xu, A., & Lam, K. S. L. (2014). Adropin is a brain membrane-bound protein regulating physical activity via the NB-3/Notch signaling pathway in mice. *Journal of Biological Chemistry, 289*(37), 25976-25986.

Yin, R. K. (2018). *Case study research and applications: Design and methods*. SAGE.

Zadina, J. (2015, October). *The emerging role of educational neuroscience in education reform.* Research Gate. https://journals.copmadrid.org/psed/archivos/ed2015v21n2a3.pdf

Appendix A

Methodology Flowchart


Methodology
Qualitative
Instruments
Surveys
Focus Group
5 Questions
Sent via school email
Self-Selected Participants
Meet Virtually
10 Discussion Questions
Merge Data
Analyze Data
Recommendations

Appendix B

District Email Asking Teachers to Participate in the Online Survey

Greetings,

My name is Tiffany Neal and I am working on completing my dissertation on Middle School Teachers' Perceptions of the Brain-Based Learning Theory and how the Implementation of Physical Brain Breaks may impact Classroom Management at Gardner-Webb University.

I am reaching out to request your help in obtaining data to better understand what middle school teachers may or may not know about the brain-based learning theory and physical brain breaks. To gain insight, I am asking teachers to complete the survey below after reading the consent form.

Gardner-Webb University IRB

Informed Consent Form for Online Survey

Middle School Teachers' Perceptions of Brain-Based Learning and the Implementation of Physical Brain Breaks as a Classroom Management Strategy

The purpose of this study is to better understand teachers' perceptions of the benefits and challenges of implementing physical brain breaks in middle school classrooms. As a participant in the study, you will be asked to answer 10 survey questions. It is anticipated that the study will require about 15 minutes of your time. Participation in this study is voluntary. You have the right to withdraw from the research study at any time without penalty. You also have the right to refuse to answer any question(s) for any reason without penalty. The information that you give in the study will be handled confidentially. Your data will be anonymous which means that your name will not be collected or linked to the data. There are no anticipated risks in this study. You will

receive no payment for participating in the study. You have the right to withdraw from the study at any time without penalty by exiting the survey. Data from this study will not be used or distributed for future research studies. At the end of the survey participants will be asked if they would like to participate in a focus group.

If you have questions about the study, contact:

Researcher's name: Tiffany Neal

Researcher telephone number: 336-253-8720

Researcher email address: tneal3@gardner-webb.edu

Faculty Advisor Name: Dr. Ben Williams

Faculty Advisor telephone number: 919-634-0346

Faculty Advisor email address: bwilliams22@gardner-webb.edu

Dr. Sydney K. Brown

IRB Institutional Administrator

Telephone: 704-406-3019

Email: skbrown@gardner-webb.edu

Clicking the link below to continue on to the survey indicates your consent to participate in the study:

https://docs.google.com/forms/d/e/1FAIpQLSd1ho9aENJdJJ8Efh5LmSUyvCrjoy9rFn_U-g6pvduciIaxsg/viewform?usp=pp_url

If you are not 18 years of age or older or you do not consent to participate, please close this window.

In addition to the survey, I will be conducting a focus group to just discuss what middle school teachers may or may not know about the brain-based learning theory and physical brain breaks using ten questions.

If you would like to participate in a focus group about physical brain breaks and

the brain-based learning theory, please use the following link to provide your contact information. This link is provided at the end of the survey.

https://docs.google.com/forms/d/e/1FAIpQLSd2cb0-5-2FSWplxn4i_2uafrzuGeRHpOort-I9fIbqUrkdtA/viewform?usp=pp_url

Thank you for taking the time to help me with this endeavor and I look forward to talking with you. If you have any questions, please email me or call me at 336-253-8720. The survey nor the focus group is required but appreciate your help!

--

Tiffany C. Neal, M.Ed.

7th Grade Social Studies Teacher

XXXXXXXX Middle School

Appendix C

Informed Consent Form

Gardner-Webb University IRB

Informed Consent Form

Title of Study: **Middle School Teachers' Perceptions of Brain-Based Learning and the Implementation of Physical Brain Breaks as a Classroom Management Strategy**

Researcher: Tiffany Neal, Researcher/Education

Purpose

The purpose of the research study is to better understand teachers' perceptions of the benefits and challenges of implementing physical brain breaks in middle school classrooms.

Procedure

During the focus group, the participants will be asked to answer ten questions based on their personal experiences in the classroom as it relates to their understanding of the brain-based learning theory and physical brain breaks in the middle school classroom. The participants will meet via zoom. Participants can skip any question that causes discomfort and they can stop participating in the focus group at any time.

Time Required

It is anticipated that the study will require about 45 *minutes/hours* of your time.

Voluntary Participation

Participation in this study is voluntary. You have the right to withdraw from the research study at any time without penalty. You also have the right to refuse to answer any question(s) for any reason without penalty. If you choose to withdraw, you may request that any of your data that has been collected be destroyed unless it is in a de-identified state.

Confidentiality

Data will be collected using responses from the focus group questions. Data will be stored using the researcher's personal computer. The data will be deleted after the researcher has presented all findings.

Data Linked with Identifying Information

The information that you give in the study will be handled confidentially. Your information will be assigned a code number (or a pseudonym.) The list connecting your name to this code will be kept in a locked file. When the study has been completed and the data have been analyzed, this list will be destroyed. Your name will not be used in any report.

Confidentiality Cannot be Guaranteed

In some cases, it may not be possible to guarantee confidentiality (e.g., an interview of a prominent person, a focus group interview). Because of the nature of the data, I cannot guarantee your data will be confidential and it may be possible that others will know what you have reported.

Risks

There are no anticipated risks in this study.

Benefits

There are no direct benefits associated with participation in this study. The study may help us to understand middle school teachers' perspectives on the brain-based learning theory and the implementation of physical brain breaks as a classroom management strategy. The Institutional Review Board at Gardner-Webb University has determined that participation in this study poses no more than minimal risk to participants.

Payment

You will receive no payment for participating in the study.

Right to Withdraw From the Study

You have the right to withdraw from the study at any time without penalty.

How to Withdraw From the Study

- If you want to withdraw from the study, tell the researcher and leave the focus group meeting. There is no penalty for withdrawing.
- If you would like to withdraw after your materials have been submitted, please contact … Tiffany Neal at tneal@gardner-webb.edu or 336-253-8720

If you have questions about the study, contact:

Researcher's name: Tiffany Neal
Student Role: EdD Candidate
School/Department, Gardner-Webb University
Researcher telephone number: 336-253-8720
Researcher email address: tneal3@gardner-webb.edu

Faculty Advisor Name: Dr. Ben Williams
Faculty Research Advisor
School/Department, Gardner-Webb University
Faculty Advisor telephone number: 919-634-0346
Faculty Advisor email address: bwilliams22@gardner-webb.edu

If the research design of the study necessitates that its full scope is not explained before participation, it will be explained to you after completion of the study. If you have concerns about your rights or how you are being treated, or if you have questions, want more information, or have suggestions, please contact the IRB Institutional Administrator listed below.

Dr. Sydney K. Brown
IRB Institutional Administrator
Gardner-Webb University
Telephone: 704-406-3019
Email: skbrown@gardner-webb.edu

Voluntary Consent by Participant

I have read the information in this consent form and fully understand the contents of this document. I have had a chance to ask any questions concerning this study and they have been answered for me. I agree to participate in this study.

_____ Date: _____

Participant Printed Name

_____ Date: _____

Participant Signature

You will receive a copy of this form for your records.

Appendix D

Survey Questions

Physical Brain Breaks Survey

Thank you for taking the time to complete this survey. Physical brain breaks are times away from instruction, working or learning while participating in movement.

tcneal@rock.k12.nc.us (not shared) Switch account

* Required

SQ1. What grade(s) do you teach? *

Your answer

SQ2. What subject(s) do you teach? *

Your answer

SQ3. In class, do you give your students an opportunity to take a break from work and learning? *

- ◯ Yes
- ◯ No

SQ4. In class, do you give physical brain breaks as is in giving students a break from work and learning while participating in some type of movement? *

- ◯ Yes
- ◯ No

SQ5. In total, how long does your physical brain break(s) last? *

- [ ] N/A
- [ ] 0-30 seconds
- [ ] 30-60 seconds
- [ ] 1-3 minutes
- [ ] 3-5 minutes
- [ ] 5 or more minutes

SQ6. Do you give the same physical brain breaks daily? *

- ( ) Yes
- ( ) No
- ( ) N/A

SQ7. Do you think students benefit from physical brain breaks? *

- ◯ Yes
- ◯ No

SQ8. What challenges do you experience giving physical brain breaks? *

Your answer

SQ9. What prevents you from giving physical brain breaks? *

Your answer

SQ10. Would you like to learn more about physical brain breaks? *

- ◯ Yes
- ◯ No

Submit Clear form

AFTER SUBMISSION

Confirmation message

THANK YOU for completing the survey. If you would you like to participate in a focus group about physical brain breaks and the brain based learning theory, please use the link below to provide your contact information: https://docs.google.com/forms/d/e/1FAIpQLSd2cb0-5-2FSWplxn4i_2uafrzuGeRHpOort-I9fIbqUrkdtA/viewform?usp=pp_url

Edit