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Brain Breaks and Engagement

Abstract

This action research project explored the effects of brain breaks on student engagement. The participants in this study were 22 eighth-grade students in a language arts classroom at a public middle school in Northwest Iowa. Students were observed to determine engagement for the last 18 minutes of class. A no-treatment period was observed in order to create a baseline, followed by a treatment period to demonstrate any increase or decrease in overall student engagement. The treatment consisted of a three-minute brain break implemented half-way through the class period. These breaks included two minutes of physical activity followed by one minute of relaxation and breathing. A trained observer used a running record to note engagement data for each student. The students were surveyed following the observation period. The results of this study indicated an increase in engagement when brain breaks were used. The results of the survey indicated positive student perceptions toward brain breaks. Due to the positive results, the teacher in this study plans to continue using brain breaks in her classroom.

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Brain Breaks and Engagement

by

Joe'l Vander Waal

B.A. Dordt College, 1997

Action Research Report
Submitted in Partial Fulfillment
of the Requirements for the
Degree of Master of Education

Department of Education
Dordt University
Sioux Center, Iowa
April 2020

Brain Breaks and Engagement

by

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“Never stop learning.” “It’s okay not to know how to do something as long as you don’t stop trying to figure it out.” “Ask questions, wonder, explore the world!” These are just a few statements I have found myself repeating in my middle school classroom over the last twenty-something years. Therefore, I start my thank-you list with my students -- past, present, and future -- for pushing me to follow suit. Pursuing a graduate degree in education was simply a formal way to continue learning about teaching -- something I’ve always been passionate about and will never stop exploring. Secondly, I need to thank my husband, Derrick, and my children, Jaclyn and Jenna. I wouldn’t have been able to accomplish my degree without them. They have graciously sacrificed time, money, and sleep right alongside me, and their support has kept me going. It is my hope that my love for learning has been contagious. I would also like to thank my professors Pat Kornelis, Dave Mulder, Ed Starckenburg, Kathleen VanTol, Tim VanSoelen, and Steve Holtrop for their energy and enthusiasm for our work in education. Keep inspiring us to change the world through our classrooms. You are the best role models a teacher could have. Most importantly, thank you Jesus for walking beside me each day. I pray your light will shine through in all that I do.

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Abstract

This action research project explored the effects of brain breaks on student engagement. The participants in this study were 22 eighth-grade students in a language arts classroom at a public middle school in Northwest Iowa. Students were observed to determine engagement for the last 18 minutes of class. A no-treatment period was observed in order to create a baseline, followed by a treatment period to demonstrate any increase or decrease in overall student engagement. The treatment consisted of a three-minute brain break implemented half-way through the class period. These breaks included two minutes of physical activity followed by one minute of relaxation and breathing. A trained observer used a running record to note engagement data for each student. The students were surveyed following the observation period. The results of this study indicated an increase in engagement when brain breaks were used. The results of the survey indicated positive student perceptions toward brain breaks. Due to the positive results, the teacher in this study plans to continue using brain breaks in her classroom.

Early adolescents undergo major changes and grow at levels paralleled only to infancy. “In fact, very few developmental periods are characterized by as many changes in as many areas” (Eccles & Wigfield, 1997, p. 15). Early adolescents are growing taller and stronger, they are developing a greater sense of independence and identity, and they are experiencing hormonal changes and the onset of puberty.

In response, schools need to create developmentally-appropriate environments and implement developmentally-appropriate activities for the students they are teaching. Eccles and Wigfield (1997) stressed the “importance of looking at the fit between the needs of young adolescents and the opportunities afforded them in their middle grades school environment. A poor fit would help explain the decline in motivation associated with the transition to middle school” (p. 22). Middle school educators need to meet young adolescents’ varying biological, social, emotional, and cognitive needs. “Young adolescents have concerns about the normalcy of their development, and similarly, middle-level school educators have the responsibility to base curricular and instructional practices on young adolescents' development” (Manning, 1993, p. 11).

One area that middle school educators need to consider is how to address adolescents’ need for movement. Because of early adolescents’ rapid biological changes, adolescent bodies need physical activity. Manning (1993) suggested that educators:

- emphasize hands-on activities and experiences, allowing students to move around the classroom to avoid long periods of passive work,
- stress physical education programs that address the fundamentals of movement, physical fitness, and lifetime sports,
- stress physical activities designed to meet individual differences,

- promote physical activities and daily exercise for all students, and
- emphasize intramural programs for all students and de-emphasize intense competitive interscholastic sports. (p. 16-17)

Manning (1993) also explained that when early adolescents' physical activity needs are not being met, they become uncomfortable and find alternate ways to meet their needs. For example, when middle school students struggle to sit still in their desks for long periods of time, they might take a walk to the pencil sharpener or the restroom. If they are not allowed to walk around during class, they could become vocally disruptive or pester their neighbors. These off-task behaviors build up and create negative classroom environments (p. 41).

Instead of adhering to the developmental appropriateness of incorporating adequate movement into the typical middle school schedule, many schools have buckled under the pressure to increase rigor and improve standardized test scores. Core academic classes such as reading, math, and science take precedence over physical education and recess in the daily schedule, and most academic core teachers do not incorporate adequate physical activity into their instructional activities. In a study on physical activity in middle school, Alderman, Benham-Deal, Beighle, Erwin, and Olson (2012) found that “for the most part, schoolwork done in the classroom does not require students to be physically active” (p. 644). In addition, many education systems are actually decreasing the number of minutes allowed for scheduled movement breaks, such as recess and physical education classes, within their middle school schedules:

According to a national study conducted by the Center on Education Policy in 2007, since the passing of NCLB in 2002 . . . 20 percent of middle schools have significantly increased the instructional time they allocate to reading/language arts and math. To

accommodate such increases, 44 percent of school districts reported cutting time in such areas as social studies, art, music, physical education, and recess. On average, schools reduced the time allotted to these subjects by more than 30 minutes per day. (Trost & van der Mars, 2009, p. 1)

One way to counter the trend of decreasing physical activity in middle school might be to include more brain breaks within the middle school classroom. Brain breaks have been well-researched and well-received at the elementary school level (Ackerman, 2018; Baker, Elliott, Barnidge, Estlund, Brownson, Milne, Kershaw & Hashimoto, 2017; Partipilo & Nillas, 2015; Perera, Frei, S., Frei, B., & Bobe, 2015; Trambley, 2017; Weslake & Christian, 2015). After conducting a study using brain breaks with four- and five-year-olds, Ackerman (2018) concluded that “Added movement opportunities are found to increase student engagement, and thus minimize student off-task behaviors” (p. 27). While research studies show strong support for brain breaks with young children, the effects of brain breaks on middle school students need further study.

Purpose

The purpose of this study is to describe the effects of brain breaks on middle school students’ classroom engagement. To that end, the following research question was explored.

Research Question

1. Does the implementation of brain breaks have an effect on eighth-grade students’ engagement in learning activities?
 - a. Will brain breaks increase on-task behaviors (following directions, focusing on work, and contributing to a positive classroom climate) during classroom activities?

- b. Will brain breaks decrease off-task behaviors (not following directions, not focusing on work, and creating a negative classroom climate) during classroom activities?

Definition of Terms

For the purpose of this research study, the following definitions will be used. The definitions provided are those of the researcher unless otherwise noted.

Brain break: short, simple breaks from learning that can be implemented within the classroom.

Developmentally-appropriate practice/best practice: providing students with researched tasks/activities that are good for their development and learning age.

Early adolescent/young adolescent: someone who is between the ages of 10-14 (Manning, 1993, p. 6-7).

Focus/on-task behavior/engagement: the ability to pay particular attention to the task or activity.

Middle school: a school that intends to meet the developmental needs of 10-14-year-old students (Manning, 1993, p. 7-10).

Negative classroom climate: a classroom where students are not motivated to work on assigned tasks and exhibit negative emotions such as boredom, hopelessness, loneliness, sadness, jealousy, anger or hatred.

Off-task behavior: anything that a person does that is not directly related to the intended task or activity.

Positive classroom climate: a classroom where students are motivated to work on assigned tasks and exhibit positive emotions such as joy, gratitude, interest, hope, pride, amusement, awe or love.

Literature Review

For students to learn and grow, they must be able to engage in the instructional activities that are provided for them daily. Yet, many middle school students struggle to focus and remain productive for the time that is needed to accomplish these important instructional tasks (Godwin, Almeda, Seltman, Kaib, Skerbetzd, Baker, & Fisher, 2016).

One of the issues that causes students to struggle to focus and remain productive is that their daily physical needs are not being met. Zoller Booth (2011) explained that about half of the 103 middle school students she interviewed over a three-year study felt that they needed more physical activity each day. “The students in this study simply expressed in their own words what scientific research has suggested for some time: young adolescents need to exercise to develop healthy minds and bodies . . . they will have a difficult time succeeding in school if their basic physiological needs are not met” (Zoller Booth, 2011, p. 21).

Manning (1993) explained that while researchers have provided educators with plenty of physical, psychosocial and cognitive theories for developmentally appropriate instruction, the process of turning the theories into practice has been somewhat slow -- especially for the years after elementary school. For example, Manning stated that 10- to 14-year-old adolescents have specific needs that are often overlooked by our educational system. One such need stems from young adolescents’ rapidly changing bodies, causing them to experience discomfort and a lack of coordination. “Young adolescents experience a growth spurt marked by a rapid increase in body size, as well as readily apparent skeletal and structural changes” (Manning, 1993, p. 13). On top of growth in height and weight, adolescents also experience the onset of puberty. These changes are known to be the most intense and rapid changes of any stage in human development (p. 14). Because of these rapid changes to adolescent bodies, educators need to give middle school

students time to stretch and walk around the classroom. They should also avoid long periods of passive instruction (p. 16-17).

There are many reasons that middle school students do not regularly receive the physical activity they need to focus and remain productive students. Perera et al. (2015) found that while classroom teachers wanted to implement physical activity brain breaks, they indicated that there was a lack of time, funding, space, and teacher training to do so (p. 62).

Baker et al. (2017) studied the implementation and evaluation of environmental and policy interventions for promoting physical activity in rural schools. They found that “there are fewer opportunities to be physically active during the school day than in the past decades as schools must meet academic achievement standards” (p. 539). Teachers who implemented brain breaks during Baker et al.’s study noted that while they understood the connection between physical activity and improved academics, and even though they saw positive changes after implementing brain breaks, academics would remain the focus and physical activity would only be an afterthought.

In other academically excelling countries, breaks are more common. Chang and Coward (2015) stated that students in China, Korea, Japan, and Finland have significantly more break time than students in the United States. “For elementary students in Shanghai, the length of recess time is almost 40% of a whole school day. Recess is slightly less for middle schools and high schools” (p. 15). As students in Shanghai get older, they are in school for more hours, but as their hours increase, the frequency of their breaks also increases.

One way that middle school teachers can help counter the effects of young adolescents’ rapidly changing bodies and increase physical activity in the daily schedule is to implement regular brain breaks. While there are many different definitions, all of the literature agreed that

brain breaks are short, simple breaks from learning that 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 re-energize students” (Baker et al., 2017, p. 539) so the children can be “in the most receptive state for learning” (Weslake & Christian, 2015, p. 2).

There is also a wide variety of brain breaks a teacher can use -- from scripted programs and online videos to quiet stretching and time to daydream. There are three basic categories of brain breaks: physical activity breaks, relaxation and breathing breaks, and content-related breaks (Weslake & Christian 2015).

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). Likewise, Ackerman (2018) found that “by taking a few minutes of instructional time and devoting it to physical activity, students required fewer reminders for their off-task behaviors, and were thus spending more time attending to and engaged in your instruction which follows” (p. 28). 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” (p. 1). Teachers interviewed in a study by Baker et al. (2017) explained that they saw behavioral problems decrease and student focus increase after implementing physical activity brain breaks. They also felt that physical activity brain breaks were a contributing factor in increased academic achievement because students had increased focus and engagement (p. 541). According to a meta-analysis study on school-based physical activity and academic performance conducted by the Centers for Disease Control and Prevention (2010):

Positive associations were found across measures of academic achievement, academic behavior, and cognitive skills and attitudes, but there are some interesting patterns for different outcomes within these categories. . . . physical activity interventions may offer one approach to improving academic behaviors (e.g., classroom conduct) in some youth. (p. 28)

Lastly, Weslake and Christian (2015) found that physical activity and relaxation and breathing brain breaks were more effective at helping students stay on-task than content-related brain breaks (p. 44).

Much research has taken place on the importance of physical activity brain breaks in early childhood and elementary schools. One such study with Oregon public elementary schools found that of the 379 schools that responded, 92 percent did not meet the U.S. Centers of Disease Control and Prevention recommendations for physical education. The study also found that 84 percent of the 116 teachers who responded were concerned about student physical activity levels, and 88 percent were interested in trying physical activity breaks in their classroom curriculum. As a result, an additional survey was sent out that included an exercise DVD called “Brain Breaks: Classroom Fitness for Children.” In this final survey, 86 percent of the teachers who responded felt that using physical activity brain breaks provided a beneficial amount of physical activity, 91 percent felt that it improved student concentration, and 91 percent intended to continue using physical activity brain breaks in their elementary school classrooms (Perera et al., 2015, p. 55).

A research study by Partipilo and Nillas (2015) found that after a high-energy physical activity brain break, the 23 first-grade students they observed and interviewed were “engaged in their work, did not require redirection, and got back to work quickly and quietly” (p. 1).

Physical activity brain breaks paired with relaxation and breathing brain breaks have also been studied at the elementary level. Trambley (2017) observed three second-grade students during their 120-minute language arts block both before and after physical activity and relaxation and breathing brain breaks were implemented. The specific brain breaks she used were five-minute *Go Noodle* videos that included guided dancing, meditation, guided exercise, and guided yoga. They were shown to the entire class every 20 minutes during their 120-minute class time. The results of the study did show that after brain breaks were implemented, there was a decrease in inappropriate classroom behavior for all three students that included fewer unwarranted vocalizations, out-of-seat, and off-task behaviors (p. 17).

An even younger age group was studied by Ackerman (2018) to determine the relationship between movement and student behaviors in a public preschool setting with four- and five-year-old students. Twenty-five students were observed at the end of their half-day of preschool while they attended their large-group meeting. Three different movement options were given on different days that included having no break, having a 10-minute brain break and having a 15-minute recess break. Observers recorded any reminders students were given to pay attention during the large-group meeting. The findings of the study showed that when the students were offered more movement opportunities, fewer reminders for off-task behavior were needed for the majority of the students (p. 28).

Research on the importance of brain breaks in middle school is much scarcer. A study of research on brain breaks quickly revealed 25 studies for elementary students and three studies for middle school students. Mouw (2015) studied physical activity brain breaks and time-on-task with 24 sixth-grade students in a language arts classroom. She used three-minute cardio- and skill-based exercise brain breaks and observed time-on-task for each student. She also surveyed

each student at the conclusion of the observation period. Her findings were similar to the elementary school studies in that the physical activity brain breaks improved overall time-on-task behavior, and the teacher decided to continue to implement the physical activity brain breaks after the study was concluded (p. 24).

Martinez and Zhao (2018) implemented a study on relaxation and breathing breaks with middle school students. This quasi-experimental study created comparison groups comprised of middle school students who had received five or more office discipline referrals for two consecutive semesters. The control group was made up of six eighth-grade students and three seventh-grade students. These students did not participate in the three-minute relaxation and breathing brain breaks. The randomly-chosen treatment group was made up of eight eighth-grade students and one seventh-grade student. These students received three-minute relaxation and breathing brain breaks using a Muse Headband and App once a week for five months. The relaxation and breathing brain breaks were called mindfulness training sessions where students were:

guided through a calming sequence of his or her choice, either an ocean or rainforest scenario. . . . If a student's mind stayed deeply restful and calm, they were rewarded with the sound of birds. If their mind was active, the sound of wind or ocean intensified. (p. 3)

The Muse app was able to give real-time feedback and monitor progress on how calm the student remained based on brain waves that were detected by the Muse headband, a wearable device much like a heart rate monitor. The study found that all students in the treatment group increased their ability to be calm and relaxed, and their office referrals dropped significantly. The control group, on the other hand, had an increase in office referrals. Martinez and Zhao (2018)

concluded that “mindfulness training may provide students with a strategy that positively influences their ability to focus and could correlate to fewer office referrals” (p. 7).

While physical activity appears to have a positive impact on classroom academics and behavior -- especially in elementary school -- more research should be conducted on whether or not brain breaks are enough physical activity for middle school students to increase classroom engagement and decrease off-task behavior.

Methods

Participants

The participants in this study were 22 eighth graders (one section from a class of 127 eighth-graders) at a public school in a rural area of Northwest Iowa. Eleven students were Caucasian, and eleven students were Hispanic. Eleven students were male, and eleven students were female. No students were on an Individualized Learning Plan (IEP), and one student was on a 504 plan and received extended time and small group intervention during study hall. No students received EL services.

Research Design

The one-group pretest-posttest, quasi-experimental research design in this study was modeled after Mouw’s (2015) study of physical activity and time-on-task. While Mouw’s study measured time-on-task after two minutes of cardiovascular exercise and one minute of skill-based exercise, this study measured engagement after a three-minute brain break consisting of two minutes of physical activity and one minute of relaxation and breathing (See Appendix A).

The study was implemented over a seven-week period, with data collected for four weeks, for four days each week. A pretest phase with no treatment was created the first week. The treatment phase was implemented during the next five weeks -- weeks two, three, four, five,

and six. A reversal or posttest phase with no treatment was implemented during week seven. Data was collected on weeks one, five, six, and seven, resulting in two weeks of data with no treatment (none) and two weeks of data with treatment (brain break). The treatment was implemented during the same class period each day from 9:15-9:17 A.M. -- after the first 19 minutes and before the final 18 minutes of instruction.

A trained observer measured the engagement of each participant from 9:18-9:36 A.M. (the eighteen minutes after the treatment each day) during regular instruction time. Each participant was given a score based on his/her level of engagement, as noted in Appendix B. Off-task behaviors were observed as anything that a student did that was not directly related to the intended task or activity such as talking about something other than the intended learning target or not participating in the assigned task. On-task behaviors were observed as participation and following instructions. The trained observer also noted any redirections that took place during the eighteen-minute time period and recorded general observations about the classroom climate. This observer was a district-wide instructional coach that made regular appearances in the classroom, so the students would not have been influenced by her presence in the room.

After the reversal period, the students were also surveyed in order to collect the students' opinions about the implementation of brain breaks (See Appendix C).

Materials

Activities performed during the three-minute brain break periods were chosen from *Mindful Moments for your Classroom* resources, as well as chosen by the researcher based on the level of physical activity students could complete within the classroom. (See Appendix A for a complete listing of exercises and descriptions).

No materials were needed to perform the activities being used in this study. The students needed a two-foot by five-foot space within the classroom to do each movement.

The measurement tools used were a running record that measured engagement (See Appendix B) and a student follow-up survey (See Appendix C). The researcher and the observer practiced using the running record prior to the study, and the researcher piloted the student follow-up survey with a different group of eighth-grade students in the same class at the same school prior to the implementation of the study.

Results

Findings

This study was completed to determine if student engagement for eighth-graders would differ when they had brain breaks versus when they did not have brain breaks. A quantitative analysis was conducted in which the independent variable was the three-minute brain break. The dependent variable was the engagement score as identified by the trained observer using a running record (See Appendix B). The researcher counted a student as engaged when he or she scored a two (fully participating, following instructions, or working on task) in both nine-minute time periods. A student was counted as unengaged if he or she scored a zero (daydreaming, talking with/distracting others, or not working on task) or a one (working but not following directions, or working on other tasks) in either of the nine-minute time periods. Students who were absent were not calculated in the results for that day.

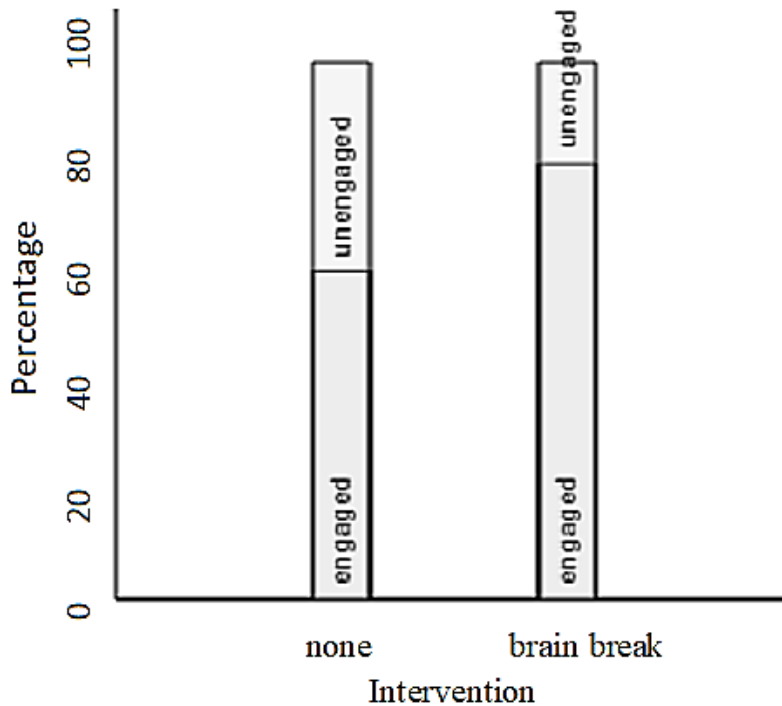


Figure 1: Bar graph showing the comparison of student engagement without a brain break and student engagement with a brain break.

A two-proportion categorical test was used to compare student engagement when they had brain breaks to student engagement when they did not have brain breaks. The goal was to see if there was any significant difference in engagement between having brain breaks and not having brain breaks. After entering the data into the two-proportion applet (Rossman & Chance n.d.), a p-value of 0.0001 was determined. This showed a significant difference in engagement scores when students had brain breaks than when they did not.

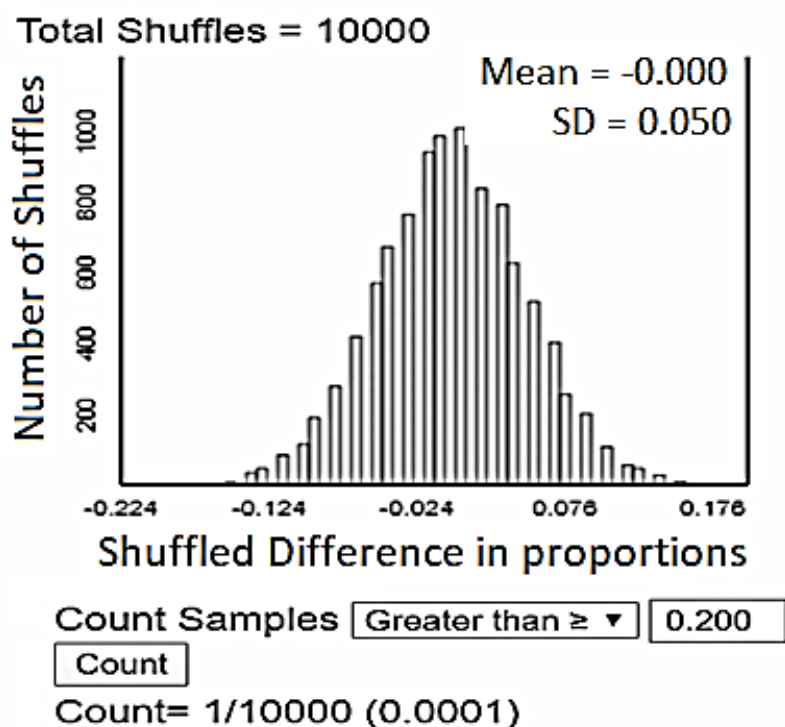


Figure 2: Bar graph showing 10,000 simulated shuffles to calculate the p-value.

In summary, these results suggested that brain breaks did have an impact on student engagement with this group of eighth-grade students. Sixty-one percent of the students were engaged and 38 percent of the students were not engaged when the class did not participate in brain breaks, while 81 percent of the students were engaged and 18 percent of the students were not engaged when the class participated in brain breaks. Due to the low p-value with 10,000 simulated shuffles, strong evidence against a null hypothesis was indicated.

A student follow-up survey (see Appendix C) was also used to gauge students' perceptions of the brain breaks that were implemented. When asked to best describe their experience, nine percent found them very enjoyable, 68 percent found them enjoyable, and 23 percent were neutral. No students found brain breaks unenjoyable or very unenjoyable.

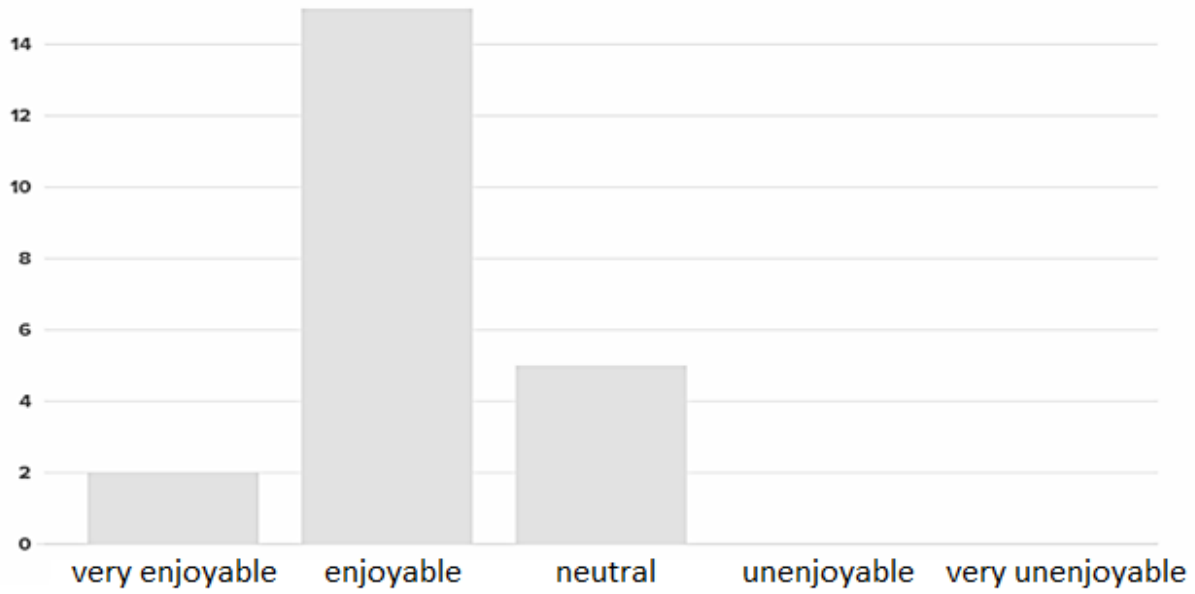


Figure 3: Bar graph showing how students best described their experience with brain breaks.

When asked to best describe their attitude toward classwork after a brain break, nine percent described their attitude as energetic and ready to work hard, 50 percent described their attitude as ready to work, 32 percent described their attitude as neutral, 4.5 percent described their attitude as not wanting to work but willing to if they had to, and 4.5 percent described their attitude as distracted and unwilling or unable to work.

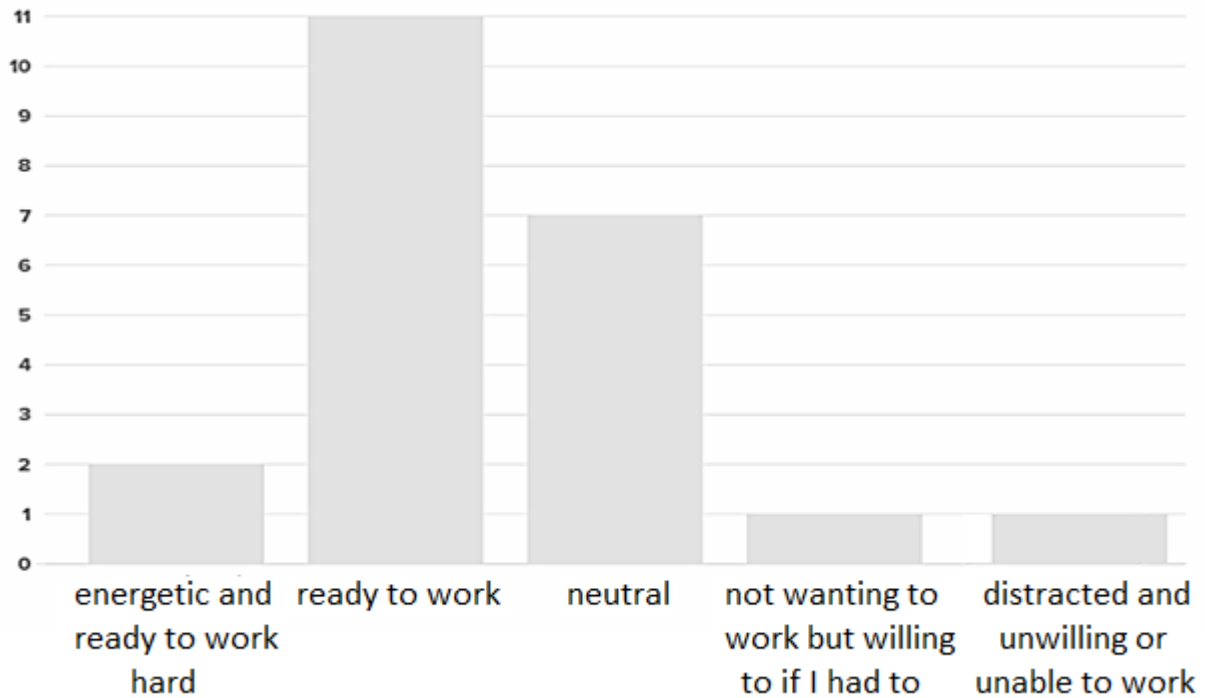


Figure 4: Bar graph showing how students best described their attitude toward classwork after a brain break had been implemented.

When asked to best describe how they felt in class after the brain break, 4.5 percent reported feeling very joyful, interested, and hopeful; 65 percent reported feeling joyful, interested, and hopeful; 32 percent reported feeling neutral; no students reported feeling bored, sad, angry, or hopeless; and no students reported feeling very bored, sad, angry, or hopeless.

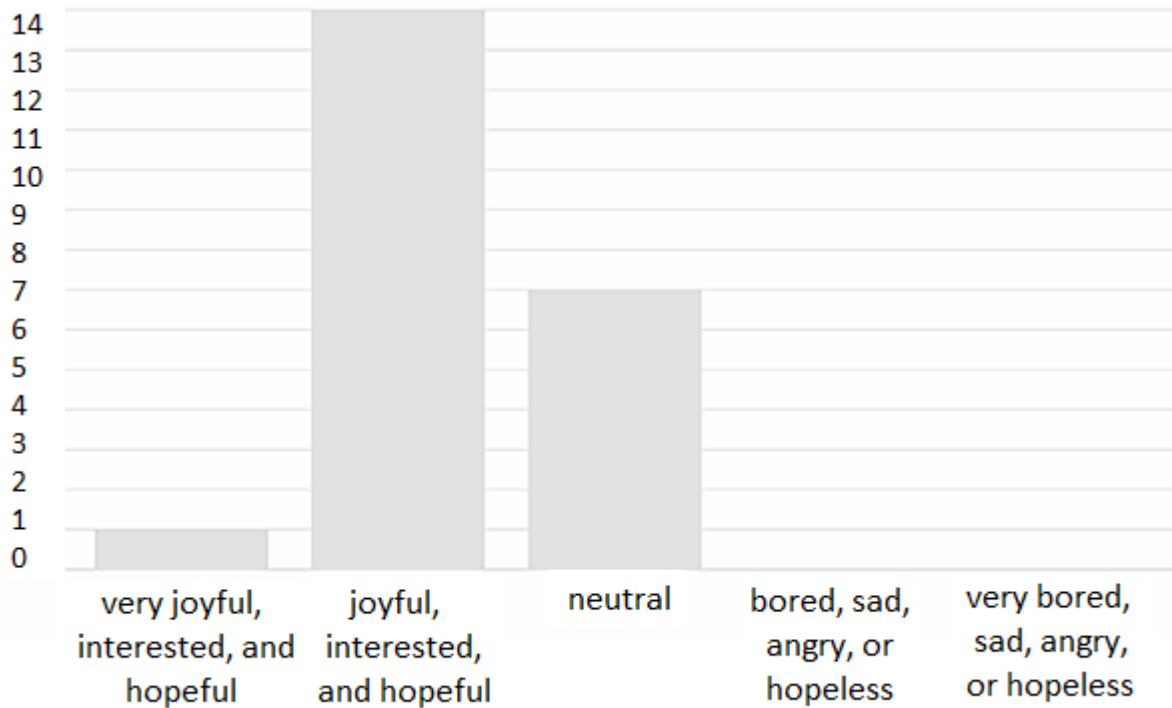


Figure 5: Bar graph showing how students best described their feelings after having a brain break.

Finally, when asked if brain breaks should continue, 59 percent said yes, 32 percent said yes but with changes, and nine percent said no. Of the seven students that indicated yes but with changes, five explained that they would change the relaxation and breathing portion of the brain break. Three wanted it to be longer, one wanted it to be better enforced, and one thought that a few of the breathing options should be eliminated because they felt weird. All three who wanted brain breaks to be longer stated that they wanted to do more relaxation and breathing and less movement. The other two students who indicated they wanted to continue with brain breaks but with changes gave reasons that pertained to the timing of the brain breaks. One wanted to change from the middle of class to the beginning of class, and the other wanted to skip the brain breaks on reading and test days.

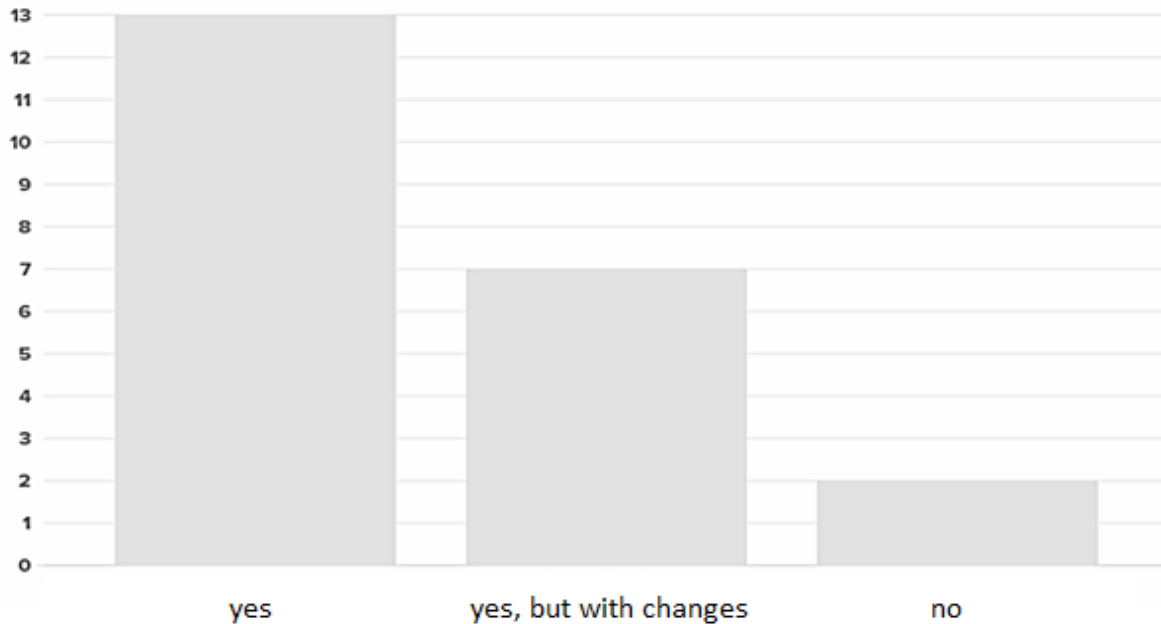


Figure 6: Bar graph showing students' opinions on whether or not brain breaks should continue.

In summary, the student follow-up survey (see Appendix C) suggested that most of the students are of the opinion that brain breaks were either a good or not bad experience. They indicated that brain breaks either help or do not hinder their attitudes toward classwork or their emotions, and they would like to continue having brain breaks as indicated by figures 3-6.

When viewed together, the levels of engagement that were measured and the student survey results indicated that brain breaks increased student engagement and created a positive classroom for students to learn.

Discussion

Overview of the Study

Early adolescents' bodies are constantly growing and changing, causing many middle school students to struggle with focus and engagement in school. In response, middle school educators need to create developmentally-appropriate environments and implement developmentally-appropriate activities in order for these 10- to 14-year-old students to thrive.

One aspect to consider is an early adolescent's need for movement. Middle schools often struggle to provide adequate movement in their daily schedules for many reasons, but one developmentally-appropriate activity that middle school educators could easily implement in order to increase physical activity regardless of space, time or budget restrictions is brain breaks. A brain break is a short, simple break from learning that can be implemented within a classroom. This study was designed to answer the question: Does the implementation of brain breaks have an effect on eighth-grade students' engagement in classroom activities? Previous research shows that brain breaks in younger settings have proven to be effective in increasing focus and engagement, but there are only a few studies that include middle school students, so studying brain breaks in eighth grade was a worthy investigation. Because Weslake and Christian (2015) found that physical activity and relaxation and breathing brain breaks were the most effective types of brain breaks, the researcher used a combination of physical activity brain breaks and relaxation and breathing brain breaks in this study -- starting each brain break with two minutes of physical activity and ending it with one minute of quiet relaxation and breathing.

Summary of Findings

Engagement scores of 22 eighth-grade students before, during, and after the implementation of a brain break half-way through the class period were documented. A comparison of engagement during the implementation of brain breaks and engagement without brain breaks was made. The findings of this research showed a 20 percent increase in the engagement of students when they had brain breaks versus when they did not. Eighty-one percent of the students were engaged when they had brain breaks, and 61 percent of the students were engaged when they did not.

The participants in the study were also given a student follow-up survey (see Appendix C) to determine student perceptions of brain breaks. The survey indicated that most participants enjoyed brain breaks and wanted them to continue. One student commented that, “I liked how we were just able to stop what we were doing and take breaths. For me, that helps a lot because I tend to stress a lot.” Other students thought that brain breaks should continue to happen because “it puts everyone in a good mood” and “it helps take out all the fidgets so you can focus more on school.” Brain breaks have shown to have a positive effect on classroom engagement for the group studied.

Limitations

While the researcher created a careful plan to implement this action research, there were some factors that could have affected the results. First of all, there were only 22 participants in the study -- and they were all from the same Northwest Iowa middle school. The group was also not randomly selected, but one of the predetermined sections of the eighth-grade class. This greatly limited the scope of the research. A larger, randomly selected sample that included more classrooms, grade levels, and schools may have been beneficial.

Another possible limitation was the 21 absences that the students had during the four weeks of observations. While the researcher took each absence into account when figuring the results, the absences could have led to other limiting factors. Depending upon who was absent and how often they were absent, the engagement of other participants in the classroom could have been affected. In addition, the absences could have affected the absentees' engagement upon return to the classroom. One example of this was when a participant was absent for two days due to illness. Upon return, the participant was not only confused about the content that was missed, but he/she was also fatigued quickly and unable to focus for long periods of time. Either

observing specific participants who were never absent or observing all participants over a longer test period in order to take student absences into account could have been beneficial.

A final limiting factor could be the variety of activities that took place on different days of the study. Depending upon the type of activity -- which included individual practice, silent reading, group station work, gaming, large group discussions, and assessments -- student engagement could vary greatly. Creating a study that limited the type of activity could have been beneficial.

Considerations for Further Study

One question that resulted from this study is how to adequately address the varying physical activity needs that different students have, especially as some middle schools move toward personalized learning environments. Can students be taught self-awareness when it comes to physical activity needs, and are students able to initiate their own brain breaks without disrupting their classmates? Additional research studies should be conducted on brain breaks in personalized learning environments.

A second question that resulted from this study is what effect brain breaks have on academic achievement. In the literature review of this study, it was noted that the reason many middle schools have lessened physical education and/or recess time was due to a desire to improve standardized test scores. Additional research studies should be conducted to see if brain breaks increase standardized test scores.

Recommendations

Implementing regular brain breaks in middle school classrooms is one way that middle school educators can address early adolescents' need for physical activity. Brain breaks do not take a lot of time away from important academic work, they do not take a lot of training or

teacher planning, and there are no extra costs involved. On the other hand, brain breaks are likely to increase student engagement and create positive classrooms. The researcher recommends that middle school teachers add brain breaks to their daily routines -- especially if the overall daily schedule in their middle school lacks adequate physical education classes and/or recess breaks.

Finally, the researcher will continue to implement brain breaks with the eighth-grade students who were participants in this study. The researcher will also add brain breaks with different groups of eighth-graders at different times of the day.

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Appendix A

Brain Break Activities

Suggested format: 2 minutes of physical activity followed by 1 minute of relaxation and breathing.

Physical Activity Options -- Choose 2-3 for each brain break:

- Running in place
- Marching in place with raising hands
- Jumping jacks
- Squats
- Freestyle dancing in place

Relaxation and Breathing Options -- Choose 1 for each brain break:

- Inhale Good, Exhale Bad
 - Close your eyes and begin breathing in and out through your nose. Begin to imagine clearing your mind as you wipe away all the writing from a whiteboard. Making it clear and white again. (Pause)
 - Now, begin to think of all things good in your life. Think of all the things you want to bring to yourself and into your life. As you inhale, think about bringing these qualities into your body, into yourself. (Pause)
 - As you exhale, think of exhaling out all of the negatives that no longer serve you. Think of releasing anything that does not make you better, any negative thoughts or feelings. (Pause)
 - Inhale the good and exhale out the bad. (Pause)
 - Continue to breathe this way until you feel calm and relaxed.
- Balloon Breath
 - Stand up tall in your easy pose. Place your hands on your knees and start to breathe in and out of your nose. Imagine that your body is a balloon. Imagine with each breath that you are filling up yourself completely with air.
 - As you breathe in, arch your back, let your chest and belly soften and move forward and look up. You can raise your hands up over your head if you would like.
 - As you breathe out, pull your belly button in, round your back and look down at your belly. You can wrap your arms around yourself in a big hug if you would like.
 - Repeat this movement and breath pattern several times. Breathing in as you fill up your body and breathing out of your mouth to deflate.

- Continue with your balloon breath for several rounds. Imagine the balloon getting fuller each time you inhale and as you exhale, try alternating which arm is on top during your hug.
- Lift Your Toes
 - Stand up tall and straight. You can place your hands on your table or on the back of your chair.
 - As you inhale, lift each of your toes off the floor. You may find that all your toes want to come up the first few times.
 - As you focus and concentrate, you will find that you are able to separate the toes one at a time. This will take practice and concentration.
 - Keep syncing your toe movement to your inhales and exhales.
- Counting to Three
 - Stand up tall. Begin breathing in and out through your nose for a few breaths. (Pause)
 - Begin to silently count your breaths to three. Perhaps say to yourself, “Inhale to 1, 2, 3.” (Pause) Make sure that your counting is slow and steady to calm your breath. (Pause)
 - Now add on the counting to your exhales. Perhaps say to yourself, “Exhale to 1, 2, 3.” Make sure that your counting is slow and steady to calm your breath. (Pause)
 - It is now time to put the counting on your inhales and exhales together. Perhaps say “Inhale to 1, 2, 3 and exhale to 1, 2, 3.”
 - Do this for five more rounds.
- Let Peace Begin with Me
 - Hold both hands together at heart center with your fingers extended.
 - On the word “Let” touch your pinkies together.
 - On the word “Peace” touch your thumbs together.
 - On the word “Begin” touch your ring fingers together.
 - On the word “With” touch your pointer fingers together.
 - On the word “Me” touch your center fingers together.
 - Repeat these five times slowly all together.

*Activities compiled by the researcher’s personal experiences and from *Mindful Moments* resources (Schreiber n.d.).

*All activities can be done in a 2x5 foot space per student in a typical general education classroom.

Appendix B

Observation of Engagement

Teacher: _____ Grade Level: _____

Date: _____ Time: _____ Subject: _____

Student	9:18-9:27	9:28-9:36	Comments or Redirections
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			

Key:

0=not engaged/off-task (daydreaming, talking with or distracting others, not working on task)

1=slightly engaged/slightly on task (working but not following directions or working on other tasks)

2=engaged/on task (fully participating, following instructions, working on task)

General Observations about the Classroom Climate:

Appendix C

Student Follow-Up Survey

Name _____ Student # _____ Date _____

1. Which of the following categories best describes your experience with brain breaks in class this quarter?					
My experience was:	5	4	3	2	1
	very enjoyable	Enjoyable	neutral	unenjoyable	very unenjoyable

2. What did you like and/or dislike about our brain breaks this quarter?

3. Which of the following categories best describes how your attitude toward classwork after we've had a brain break?					
I was:	5	4	3	2	1
	energetic and ready to work hard	ready to work	neutral	not wanting to work but willing to if I had to	distracted and unwilling or unable to work

4. Which of the following categories best describes how you felt in class after we've had a brain break?					
I felt:	5	4	3	2	1
	very joyful, interested, and hopeful	joyful, interested, and hopeful	neutral	bored, sad, angry, or hopeless	very bored, sad, angry, or hopeless

5. Circle the category that best describes your opinion. Explain why you chose Yes or No OR explain the changes you wish to implement.			
Should we continue to take brain breaks?	Yes	Yes but with changes	No
	Explain why:	Explain changes:	Explain why: