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Growth Mindset in Physical Education

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Growth Mindset in Physical Education

Kyle Herber

Northwestern College

An Action Research Project Presented
in Partial Fulfillment of the Requirements
For the Degree of Master of Education

Dr. Daniela Syed

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Abstract

Growth mindset continues to be a popular topic of conversation in the field of education. The purpose of this study was to observe and analyze the impact growth mindset intervention can have on student's performance as well as their self-efficacy in physical education. This study took place in an elementary school in the northwest suburbs of Minneapolis, using four different 4th grade classes. For this study, the author collected data in the form of pre- and post- Likert scale surveys as well as pre- and post- presidential fitness tests. Classes were randomly selected to receive growth mindset intervention or be in a control group. Students in the growth mindset intervention group received and participated in different growth mindset lessons, feedback, and instruction throughout the time of the study. Constant comparison method as well as descriptive statistics was used to analyze survey and fitness test data, resulting in a couple different themes.

Growth Mindset in Physical Education

Growth mindset and the idea of observing how people react to failure, continues to be a popular topic of discussion in the education world, especially amongst classroom teachers (Akin & Radford, 2018). Educators are always looking for ways to help their student's achieve at higher levels and demonstrate deeper learning. A student's mindset about their intellect can directly impact their motivation level as well as achievement (Haimovitz & Dweck, 2017). Mindsets and theories take the center stage for this research, and more and more teachers are trying to unlock their student's potential by creating in them more of a growth mindset. First, educators are focusing more on the idea that people have the capacity to grow their abilities not just stuck with how they are, this is called implicit theory (Haimovitz & Dweck, 2017). Growth mindsets and fixed mindsets are the two mindsets many educators are studying. A person with a growth mindset would endorse the belief that their intelligence/skills/abilities can be improved over time. Whereas, a person with a fixed mindset believes that their intelligence/skills/abilities are unchangeable, just something they were born into (Degol et al., 2018). Keeping these in mind, research continues to be done observing the impact that these differences in mindset has on students and their learning.

Some general studies and evaluations have been conducted, just observing how students react to different situations such as when Dweck created a workshop for seventh graders and assigned students to two groups, one was a growth mindset group and the other a fixed mindset (Dweck, 2016; Hochanedel & Finamore, 2015). The students were unaware of the group they were assigned, but groups were asked to read an article centered around the ability to grow their intelligence. The small study concluded that when students learn how to persevere, a growth mindset starts to develop, which in return can lead students to feel like they can overcome any

challenges (Hochanedel & Finamore, 2015). Other studies (Claro, Paunesku, & Dweck, 2016; Smith et al., 2018) have focused more on student achievement and how mindsets can affect different student groups or different classroom settings.

Some studies (Rhew et al., 2018) (Brougham & Kashubeck-West, 2018) have changed the variable of the subject being taught, but also the demographic of students. Rhew et al. (2018) found that online programs such as Brainology, may not always make a difference in the results of student's performance, but this use of technology can alter a student's motivation towards reading or other subjects which in turn often leads to higher student achievement (Rhew et al., 2018). Educators all around the world should accentuate a curriculum that integrates a growth mindset model of instruction while focusing on persevering, utilizing constructive feedback, and accentuating the flexibility of student intellect (Rhew et al., 2018). With there being mixed results from different studies, whether it be a students' self-efficacy towards a subject or their achievement, it's evident that more research centered around growth mindset needs to be conducted.

Review of the Literature

Mindsets are becoming a popular area of study for researchers and educators alike. The term growth mindset and fixed mindset were coined by Carol Dweck (Dweck, 2006). Dweck's understanding of mindsets would go on to become the springboard for studying mindsets and how it can affect how people view themselves, their skills/abilities, as well a mindset can affect how people do things. Dweck (2006) defined a pupil with a growth mindset as someone who believed that they can always improve upon their abilities as well as someone who embraces failures as another opportunity to learn and grow. Conversely, a fixed mindset was defined as someone who believed their skills/abilities or intelligence are fixed traits, unmalleable (Dweck, 2006). People with a fixed mindset avoid failure at all costs because they believe it has a negative connotation related to their skills or abilities (Dweck, 2006).

Grit is another word coined by Angela Duckworth but studied by many others whether as a key variable to student success, or just another contributing factor. Grit is defined as perseverance and resiliency to reach/achieve goals (Duckworth, 2016). Some studies have can to the conclusion that grit can be a major determining factor in achieving long term goals (Hochanadel & Finamore, 2015; McGlynn & Kelly, 2017; Miller-Matero et al., 2018). Grit has also been labeled as a contributing factor to the success of cadets at West Point (Duckworth, 2016). Many different classroom and student population variables have been tested when it comes to how mindsets as well as grit, can affect student learning/achievement. Studies have been done from looking at math or science achievement/standardized test scores can be affected by a changing of mindset (Brougham & Kashubeck-West, 2018; Degol et al., 2018). Still some research is done around growth mindset producing different outcomes and how it can be a predictor of other things just through looking through a different lens, for instance, gender

(Hodge, Wright, & Bennett, 2018; Degol et al., 2018). Research continues to show that a growth mindset can build higher motivation levels for students and may also impact student achievement (Claro, Paunesku, & Dweck, 2016; Bostwick & Becker-Blease, 2018).

Growth Mindset and Student Self-efficacy/Motivation

In a study done by Verberg et al. (2018), adolescents with intellectual disabilities ranging from were selected to test out the effectiveness of an online mindset intervention called “The Growth Factory”. Verberg et al. concluded that participants with intellectual disabilities were more likely to endorse a fixed mindset than those without disabilities (Verberg et al., 2018). Rhew et al. (2018) conducted a similar study looking into special education student’s self-efficacy when growth mindset intervention/instruction was implemented in the classroom. The study determined that the special education students from grades 6th-8th grade, increased their motivation when growth mindset intervention was present (Rhew et al., 2018).

Still more research had been done surrounding the impact that mindsets can play in a daily basis in the classroom (Schmidt, Shumow, & Kackar-Cam, 2017). In a study done by Schmidt et al. (2017), students were randomly assigned to a mindset intervention training through Brainology or content writing task condition and then monitored throughout the school year depending on their group. Results showed that students from both grades that were not introduced to the mindset intervention self-reported declines in perceived control skill, interest and learning. Interestingly, only the 9th graders that received the mindset intervention throughout the year reported increased control and interest, while maintaining constant skill and learning. 7th graders did not show similar results for whatever reason (Schmidt et al., 2016).

Students that are facing difficult life transitions, whether it be something to do with their personal life or a transition to a new school setting have taken the interest of other researchers as well (Barnes & Fives, 2016; Claro et al., 2016; Yeager et al., 2016). Preparing students to deal with these transitions by developing a growth mindset can be especially helpful for kids in their early middle-level years (Barnes & Fives, 2016). Yeager et al. (2016) considered how students transitioning to high school that had a growth mindset vs a fixed mindset and how it affected their transition as well as achievement. Yeager et al. (2016) were interested in how mindsets can positively or negatively impact students and help them adjust to such big life transitions. After the students participated in numerous tests, surveys and meetings with staff; Researches concluded that a new growth mindset style intervention can positively impact students transitioning to high school or in similar life transitions (Yeager et al., 2016). Student self-reported behavior, beliefs as well as GPA were positively impacted by the different growth mindset interventions (Yeager et al., 2016). Yeager et al. (2016) reported that students from the growth mindset group were proven to have a more positive outlook on their beliefs about their IQ and abilities, while some students also improved their GPA, student's poor performance rates generally decreased.

Akin and Radford (2018) studied the importance of the learning environment and how fostering a positive learning environment can play a significant role in the development of children. Seventh and Eighth grade from different urban and rural environments completed questionnaires centered around how their environment was affected by student perception, mindset and encouragement from teachers. Responses from roughly seven hundred physical education students in an urban middle school showed that students that refused to participate were simply unmotivated. Those students concluded that they preferred learning environments

where the teachers support and encourage teamwork, cooperative games as well as make a point to enhance student self-esteem (Akin & Radford, 2018). Researchers continue to connect the dots with how mindsets, no matter the student group, can affect student self-efficacy and motivation as well as student achievement.

Several studies have also looked at how an instructor's mindset as well as beliefs can make an impact on student learning and their beliefs (Boylan, Barblett, & Knaus, 2018; Brooks & Goldstein, 2008; Smith et al., 2018; Yettick, Lloyd, Harwin, Riemer, & Swanson, 2016). Teachers that have a growth mindset towards a student's ability to learn are more apt to create an accessible and empowering classroom experience for all students which leads to great student self-efficacy as well as student learning (Smith et al., 2018). This study from Smith et al. (2018) suggests when instructors use growth-mindset type instruction/comments, student's beliefs about their own IQ and abilities can be positively impacted.

Other research done by Brooks and Goldstein (2008) have used similar mindset comparisons to gain an understanding of how student achievement/performance is impacted by a participant's self-perception of their skills/abilities or growth vs fixed mindset. Their research concluded that effective teachers recognize how their role as an educator can impact students when they have a certain mindset (Brooks & Goldstein, 2008). They understand their efforts can lead to student resiliency in the classroom and positively affect the classroom environment as well as student learning and performance (Brooks & Goldstein, 2008). Boylan et al. (2018) found that many teachers are becoming aware of mindset theory and how it can impact a student's learning in the early years of development. Unfortunately, their research (Boylan et al., 2018) as well as Yettick et al. (2016) shows that many teachers are unaware how to implement different mindset theories in their classroom even though they know the benefits they can have

on students. Teachers are also nervous it will take more time to develop this into their curriculum and interweave it within their lessons without proper training on how to do so (Boylan et al., 2018).

Growth Mindset and Student Achievement

Degol et al. (2018) used roughly fifteen hundred high school students from 9-12th grade to investigate gender juxtaposed to mindset towards STEM programs. Degol et al. were interested in understanding why females continue to be less motivated towards and shy away from STEM careers. Through surveys, observation, and looking at math achievement amongst other things, some valuable information was discovered. When it came to mindsets, they discovered that “Individuals with a growth mindset are more likely to value math, which, in turn, predicts higher career aspirations in STEM” (Degol et al., 2018). Higher math task value was endorsed by having a growth mindset, but not necessarily with higher expectancy beliefs. The results also showed that a higher task value did not predict grades, but it was shown that higher task value was directly correlated to having higher career aspirations in STEM (Degol et al., 2018). This was a major contributing factor to why the study found that females were less inclined to STEM careers. Females were more inclined to have a fixed mindset when it came to math and therefore lower achievement, which in turn led to less interest in STEM programs (Degol et al., 2018). Research from Claro and Paunesku (2014) concluded that students with a growth mindset outscored those with a fixed mindset in math and reading literacy by a significant margin. They also stated that students with a growth mindset were much more likely to take on academic challenges and receive constructive criticism in a more positive manner than those with a fixed mindset (Moser, Schroder, Heeter, Moran, & Lee, 2011).

Andersen and Nielsen (2016) were interested in how family background, beliefs and involvement could play a role in student achievement. They believed that many parent interventions turn out to be ineffective for one reason or another, especially for families of a lower socioeconomic status. They felt that parents often believed that their children's reading skills are more of a fixed trait, not something that can improve with practice help from the parents (Andersen & Nielsen, 2016). The results from their study showed that students from the treatment group saw a substantial improvement in language comprehension, decoding and text comprehension in reading. When looking at students writing skills and mechanics, students improved their expressive writing skills as well as an added benefit to the growth mindset approach for reading intervention (Andersen & Nielsen, 2016).

Other studies that look at how growth mindset can impact student achievement have shown similar results (Bostwick & Becker-Blease, 2018; Brougham & Kashubeck-West, 2018; Claro et al., 2016). Research conducted by Bostwick and Becker-Blease (2018) set out to prove that even minor mindset interventions can make a positive impact on achievement in the classroom. Bostwick and Becker-Blease (2018) hypothesized that students that were a part of the growth mindset group would master more content than students of the other two groups despite this minor intervention strategy. In the end, this minor intervention tactic resulted in increases on the midterm and final exam when comparing achievement of the growth mindset intervention group students versus the fixed mindset group students (Bostwick & Becker-Blease, 2018).

Claro et al. (2016) compared the relationship between socioeconomic background and student achievement as well as the achievement of students based on their own perceptions of their abilities. The study found that economic factors, as well as students' mindsets about their abilities, showed a strong relationship to student achievement on those standardized tests (Claro

et al., 2016). The largest predictor of student achievement from this study was based on poverty index. Claro et al. (2016) determined that just like socioeconomic status, student mindset showed to be an important predictor in student achievement (Claro et al., 2016). No matter the socioeconomic status, the correlation between a student's mindset and how it related to their achievement, showed a very strong relationship.

A similar study considering different student grouping was done by Brougham and Kashubeck-West (2018) when they evaluated what sort of impact a growth mindset can play in student academic performance in urban schools. They centered their study around the idea that growth mindset intervention could help students at two urban high schools that struggled with poor grades, poor attendance, as well as poor graduation rates, change their beliefs about their potential and achieve at a higher level. Using Mindset works website as the main source of intervention for the study, the data ended up showing that mindset beliefs were improved from the growth mindset intervention. Attendance at the participating schools were unable to be linked to the intervention as numbers between the control group and intervention group were very similar (Brougham & Kashubeck-West, 2018). However, inconclusive evidence for GPA improvement was the result even though other studies have showed mindsets can change GPA leading to more desire for research to be done based around growth mindset instruction/intervention. This study contradicts a study done by Dweck (2008) where results of the study showed students that had a growth mindset or were more welcoming to the idea of growth mindset, achieved at higher levels academically in math and science specifically (Dweck, 2008).

Li and Bates (2019) predicted that a growth mindset would substantially improve a student's resilience to failure as well as enhance positive outcomes such as their grades in school.

Li and Bates (2019) were interested in seeing how students from control versus treatment groups responded to failure of a certain task based on the intervention that they previously received. The end results of this study left Li and Bates (2019) believing that more research needed to be done. The study ended up showing no real correlation between any of the test groups and achievement, nor beliefs about their ability to the student's achievements in the classroom (Li & Bates, 2019).

Grit and the Need for Growth Mindset

Many teachers and researchers alike are building off the teaching of Dweck and her ideas about growth mindset versus fixed mindset. Teachers play an important role in helping students learn how to develop a growth mindset by teaching them about the brain and what is happening when they are learning (Robinson, 2017). Teachers need to be promoting risk taking in the classroom and encourage mistakes, offer process focused feedback while emphasizing effort more than outcomes, all while creating and holding all students to high expectations (Barnes & Fives, 2016). Students also need to know about the brain's ability to adapt and grow, to form new neural connections and why that is important for them. Active learning incorporated into different study tools as well as creating a classroom of students that are not afraid to fail are key contributors to a student's ability to foster a growth mindset as well. Students practicing positive self-talk in the classroom and learning how data can be used to improve their learning are vital to their success as well. Students need to be able to track and set their own goals so they can take full advantage of the learning process (Robinson, 2017).

A person's grit, as defined by Duckworth (2016), is a perseverance and passion for achieving long term goals. A certain resiliency to failure and wanting not backing down to a challenge but instead embracing it. Grit has been seen labeled a contributing factor to student achievement/success by several studies (Duckworth, 2016; Hodge et al., 2018; Luthans, Luthans,

& Chaffin, 2019; McGlynn & Kelly, 2017; Miller-Matero et al., 2018). Hodge et al. (2018) found that grit and engagement directly correlate with student's productivity and achievement at the university level. Their study also concluded that students with a higher level of grit, leads to higher level of student engagement, which in turn leads to even higher productivity (Hodge et al., 2018). Findings from Muenks, Wigfield, Yang, and O'Neal (2017) showed that a student's grit was an accurate indicator of their end-of-semester course grades for both high school and college students. However, they also found other student engagement variables played a larger role in prediction of student grades than grit (Muenks et al., 2017). Results from a study done by Eskreis-Winkler, Duckworth, Shulman and Beal (2014) determined that grit has a positive correlation to on-time graduation rates of students; in a related study Palisoc et al. (2017) determined students with higher grit scores were more likely and determined to entertain the idea of postgraduate training positions. Medical school students have been a popular area of study when it comes to students having grit.

In a study done by Miller-Matero et al. (2018), medical school students were hypothesized to have high levels of grit just because of the degree of difficulty of the schooling that the students would be enduring. Outcomes from the study showed that medical school students do indeed have high levels of perseverance or grit like qualities, which in return would lead to them performing better in medical school than students without those qualities (Miller-Matero et al., 2018). Also, the higher the level of grit the students had, likely the higher they perform in medical school (Miller-Matero et al., 2018). With grit being a contributing indicator to how well students achieve, a study done by McGlynn and Kelly (2017) focused more on what teachers can do for their students when it comes to grit in the classroom. They believe that teachers have a critical role in developing grit in their students by showing them perseverance

and not being afraid to fail in the classroom (McGlynn & Kelly, 2017). When a teacher was more likely to show grit and perseverance in the classroom while being okay with failure but showing how to accept challenges in a positive way in front of the students, students were more likely to adapt some of the grit like characteristics themselves (McGlynn & Kelly, 2017).

A study done by Usher, Li, Butz, and Rojas (2019) concluded grit was positively correlated to student self-efficacy. Often children that are labeled as obese, tend to have much lower self-efficacy of their skills/abilities in physical education (Rukavina & Doolittle, 2016). Child obesity in physical education class shows another need for growth mindset instruction or intervention. Grit is seen as equally important for obese students because they often feel like they are not included because certain activities in physical education are harder for them or feel like they set them up to fail because of their obesity (Rukavina & Doolittle, 2016). Which in return leads to students mindset about physical education being very negative because they do not feel like a part of the group but also do not want to be a part of the group because they do not feel like they can perform or fit in with the others. Obese students often see things in a negative light, which can make it very difficult and frustrating for them when it comes to physical education class and proving why growth mindset and inclusion in physical education can be so important. Students in any content area, with a growth mindset are more likely to accept challenge, persevere through trials, and continue to learn through tough times (Barnes & Fives, 2016).

Methods

Participants

Wilson Elementary is part of one of the largest districts in the state of Minnesota, located in the northwest suburbs of Minneapolis. The school has a population of roughly 650 students from Kindergarten through 5th grade. The student population is made up of 71.9% white students, 11.4% Black or African American, 7.7% two or more races, 5.6% Hispanic or Latino, 3% Asian, and another .3% American Indian or Alaskan. 40.6% of the student population qualify for free/reduced-price meals. Wilson Elementary also has a population of 17.4% of students that qualify for special education and another 10.2% for English Learners. Four 4th grade classes from Wilson Elementary were chosen for this study, two classes were selected randomly to be a part of the growth mindset intervention group and two were selected for the control group.

The two classes that make up the growth mindset group were comprised of a total of 51 students. There were 19 male students and 32 female students. Approximately 60.8% of the students from the growth mindset group were white, while another 17.6% were black or African American. Followed by the smaller groups of Hispanic-Latino students at 13.7% and 7.8% of the students being two or more races, as well as 1.9% Asian. Of the 51 students in the growth mindset group, 12 of the students qualified as special education students and one English Language Learner.

When looking at the two classes that made up the control group, the numbers were a little different. Of the 49 students that made up the control group, 19 of them were male students and 30 were female students. Exactly 61.2% of the students being white, 16.3% black or African American and another 12.2% being two or more races. There were no Asian students in this group and a smaller 10.2% of Hispanic-Latino students compared to the growth mindset group.

Of the 49 students in this group, 17 of them qualified as receiving special education services and three English Language Learners.

Measures

Data was collected based on a couple of different variables. The first dependent variable that was analyzed was the students' self-efficacy towards physical education. Pre and post-test surveys using Likert Scale form were created by the researcher and used to evaluate students' attitudes and perceptions of physical education and physical fitness. Quantitative data from the Likert Scale survey was recorded to analyze the results of students' feelings/perceptions of physical education more in depth. Two presidential fitness tests (timed one mile run and one-minute timed sit-up test) were implemented by the researcher to analyze the next dependent variable. The data was collected by the researcher was based on students' performance on a cardiovascular endurance test (mile run) and muscular endurance (one-minute timed sit-up test). Quantitative data was collected on an Excel spreadsheet for both pre and post-test format by the researcher for each fitness test to be able to compare data from intervention group and control group more fluently. Data was also analyzed from pre-test compared to their post-test fitness test scores to measure student improvement for students from both the growth mindset intervention group and control group of students.

Procedures

This study took place over the first 6 weeks of trimester one at Wilson Elementary. The first week of the study students from both groups were given a three-question pre-test survey to gain an understanding of their perception of physical education class and their abilities using Likert scale style survey created by the researcher. The first statement read, "I enjoy participating in physical education class", with the response choices: strongly agree, agree, neutral, disagree,

strongly disagree. The second statement, “I enjoy participating in physical activity outside of physical education class” and the last, “I believe that I have the power to improve my skills/abilities” with the same response choices for all the statements. At the end of the study, six weeks later, students from both groups were required to complete the same survey as a post-test survey to compare changes in students’ self-efficacy in physical education class and perception of their abilities.

Pre-test fitness testing took place in the first two weeks of the study. Students participated in a one-mile timed run outside on the track during the first week of the study. Scores (times) were recorded on a class list as students crossed the finish line for the 4th time, equaling one mile. In the second week of the study, students from both groups participated in the one-minute timed sit-up pre-test. Students were asked to do as many sit-ups in one minute as possible using proper form (touching elbows to knees with hands across chest holding on to their shoulders) while a partner holds their feet to the floor. Raw numerical data was collected a class list and transferred on to an Excel spreadsheet for easy comparison for the Presidential Fitness tests that were administered by the researcher. All classes participated in the same warm-up routine before activities throughout the study (to keep everyone working on muscular strength, muscular endurance and cardiovascular endurance) as well as well as the same activities/games to keep everything analogous between the two groups.

Two 4th grade classes were randomly selected by the researcher to receive growth mindset implementation/intervention throughout the study after the pre-tests, the other two classes proceeded as normal. After the one-minute timed sit-up pre-test, using an idea from the studies of Bostwick and Becker-Blease (2018) as guidance, students were sent home from class with a small piece of paper with a written transcript. Based on the group they were put in the

transcript was considered part of the growth mindset intervention or part of the control. The growth mindset groups letter read, “Everyone has the power to improve their skills/abilities if they want to, are you willing to work for that change?” The control group read “Thank you for doing your best, not everyone can be the best at something”. The classes in the growth mindset group also viewed a google slides presentation centered around growth mindset vs fixed mindset in the third week of the study. In the presentation, students learned about Dweck’s mindset theory of growth mindset vs fixed mindset, watched short video clip (Infobundl, 2014) based on growth mindset as well as participated in a couple mindset activities. In week 6, students participated in post-test fitness testing after the growth mindset instruction/intervention period to monitor changes in performance and how growth mindset intervention impacted achievement. Scores from both fitness tests were once again recorded on a class list and transferred on to an excel spreadsheet by the researcher.

Results

Student Self-efficacy

After giving the original pre-test Likert Scale survey to all 4th grade classes at the school, it was common to see a positive perception of physical education class from many students. Figure 1 shows survey results from the control group, 20 students said they agreed with the statement, “I enjoy participating in physical education class”. Another 22 students said that they strongly agree with the statement, equaling about 86% of the students in the control group expressing a positive outlook towards physical education class. Figure 1 also shows that over a third of the students in the control group felt neutral or negatively towards participating in physical activity outside of physical education class despite less than 15% of students responding that way towards physical education class. Only four students from the control group didn’t believe that they had the power to improve their skills/abilities as indicated by Figure 1.

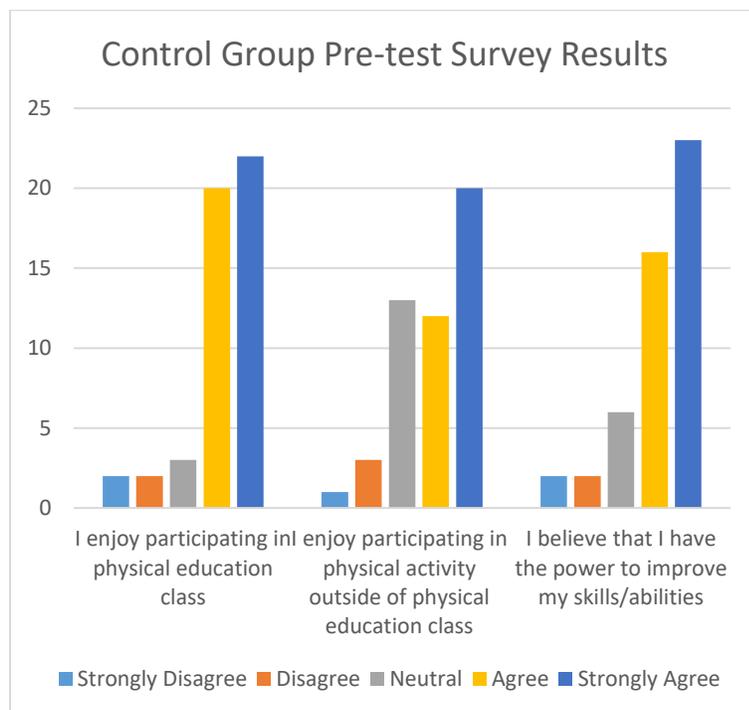


Figure 1. Control group pre-test survey.

After several weeks, the control group was given the exact same survey just as the intervention group was to measure any sort of changes within the control group over time despite not receiving any growth mindset intervention. The results in Figure 2 illustrate the changes, or lack thereof in some instances. Even though the number of strongly agree increased by three, only one student made the complete jump from feeling negatively (strongly disagreeing or disagreeing) about participating in physical education class to enjoying participating in class (agreeing or strongly agreeing). Figure 2 shows the number of students either strongly disagreeing or disagreeing about enjoying participating in physical activity outside of class stayed the same with just a slight variance in one student switching over their level in this category. The same thing happened with the students that agreed with the statement or strongly agreed, the results showed a slight change with one student moving from strongly agree down to just agree. Even though one student changed from a negative outlook to more neutral or positive on whether they can improve their skills, two students dropped from believing they had the power to improve to a more neutral or negative mindset from pre-test to post-test.

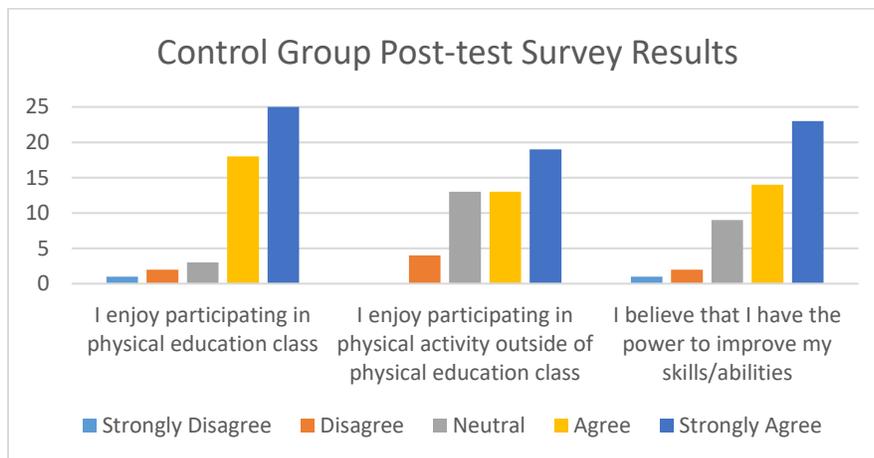


Figure 2. Control group post-test survey.

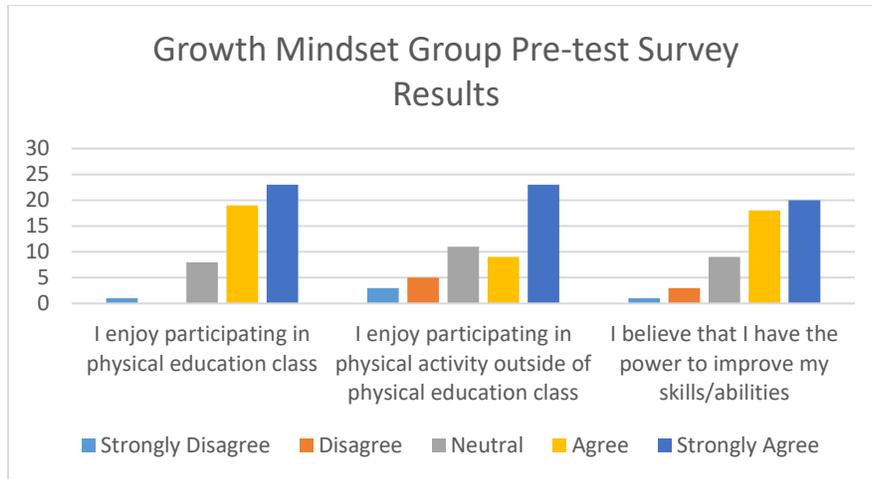


Figure 3. Growth mindset group pre-test survey.

The growth mindset intervention group was given the same three question survey in a pre-test and post-test condition. It is predicted that growth mindset intervention will positively impact student self-efficacy towards physical education as well as their own attitudes towards their skills/abilities. The results shown in Figure 3 reflect the pre-test data that was recorded from the survey responses of the growth mindset intervention group. Only one student responded negatively about their feelings towards participating in physical education class, but eight students responded neutral. Similarly, to the control group, 83% of students from the growth mindset intervention group responded positively in their feelings about participating in physical education class. About 37% of students felt neutral or negatively about participating in physical activity outside of physical education class which was like the approximate 35% of the control group. Figure 3 also shows that about 75% of the students in the intervention group believed that they had the power to improve their skills/abilities by choosing the agree or strongly agree category for the statement provided, but almost one out of every four students were unsure or didn't believe they had the power to do so.

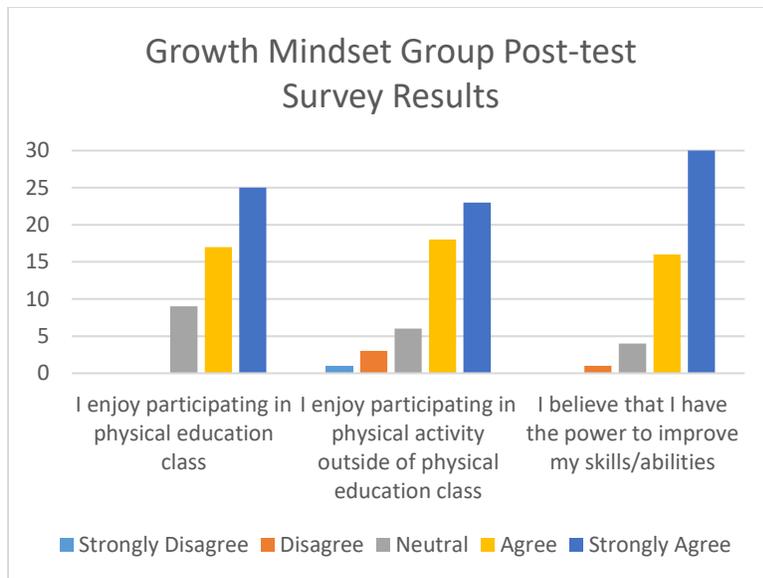


Figure 4. Growth mindset group post-test survey.

Figure 4 shows data collected from the post-test survey taken by the growth mindset intervention group. The first question of the survey yields similar results to the control group. A slight increase in a positive outlook towards physical education class is shown by the one student that strongly disagreed changing their result, leaving zero students in the negative perception of physical education class. However, the pre-test and post-test recorded the same number of students leaning towards the positive outlook on physical education class with a decrease of two students in the agree group joining the strongly agree group. When looking at student's perception of physical activity outside of class, the post-test survey saw a drastic change in students feeling neutrally or negatively, to much more positively. Approximately 37% of students in the growth mindset group originally felt negatively or neutral about participating in physical activity outside of class, but that number dropped down to about 20% for the post-test survey after growth mindset intervention. The number of students that strongly agreed that they had the power to improve their skills/abilities saw a dramatic increase going from 20 to 30 students from pre-test to post-test, making the largest jump for any section.

Student Achievement- Fitness Tests

Students were put through two different presidential fitness tests, with the same pre-test and post-test format as the Likert Scale surveys. Students from the control group did not receive any treatment in between tests, whereas, growth mindset intervention groups went through several growth mindset intervention strategies/instruction previously mentioned. It is hypothesized that student improvement on presidential fitness test scores will be positively correlated to growth mindset intervention. An independent groups *t*- test revealed that there was a marginally statistically significant difference in students receiving growth mindset intervention when it comes to running the mile run ($M = 53.21$, $SD = 160.54$, $n = 51$), as compared to students that did not receive growth mindset intervention ($M = 1.80$, $SD = 180.22$, $n = 49$), with weak effect size, $t(98) = -1.56$, $p = 0.07$, $d = 0.03$. With a one-tailed hypothesis, the calculations show that student's sit up scores were significantly affected by weather or not they received growth mindset intervention. An independent groups *t*- test revealed that there was a statistically significant difference in students receiving growth mindset intervention when it comes to performing the one-minute sit-up test ($M = 1.49$, $SD = 2.03$, $n = 51$), as compared to students that did not receive growth mindset intervention ($M = 0.63$, $SD = 2.50$, $n = 49$), with moderate effect size, $t(98) = -1.87$, $p = 0.03$, $d = 0.38$.

Figure 5 shows the comparison between pre and post-test timed mile run scores and Figure 6 shows the one-minute timed sit-up test scores from students in control group compared to the growth mindset intervention group. The information in the graph gives the reader a visual representation of the improvement of student's times (reduction of seconds), but more information can be garnered from the raw data between the four classes. The raw data shows 25 students got slower on their mile run time from pre to post test in the control group, but also 16

of the 49 students improved their score by running over a minute faster on the post test. The growth mindset intervention group had 16 students run a slower post-test mile run than their pre-test whereas, 20 of the 51 students improved their mile run score by running over a minute faster than their pre-test. The fluctuation of scores led to a major difference in the mean score (time in seconds) of the control group compared to the growth mindset intervention group as seen above.

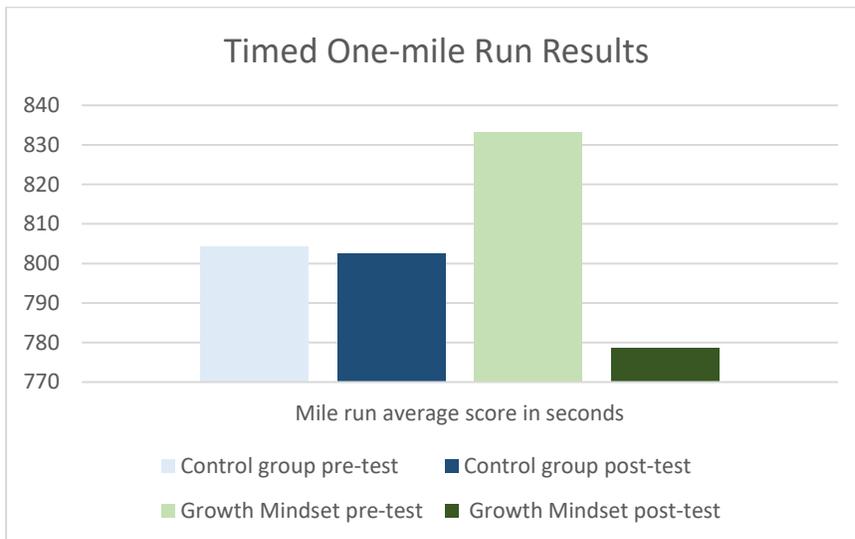


Figure 5. Timed one mile run results graph.

Adding the two control groups and the two growth mindset intervention groups together produced a larger sample size while ensuring they both endured the same testing. The control group produced an average (mean) of 1.80 seconds faster per student on their post-test mile run and increased on average (mean) of .63 sit-ups more per student from pre-test to post-test. With a standard deviation (SD) of approximately 180.22 seconds per student for the mile run in the control group. Data from the control group produced a 2.5 standard deviation for the sit-ups. However, during the sit-up test, the growth mindset intervention group produced results relative to the hypothesis. Students in the control group on average improved their score on the sit-up test by barely over half of a sit-up with an average improvement of .63 sit-ups and only 12% of the

students improving by more than the standard deviation for the group of 2.5 sit-ups. Whereas, the growth mindset group recorded an average improvement of 1.49 sit-ups per student, almost a full sit-up more than the control group. The results for the growth mindset intervention group also showed 33% of the students improved their sit-up score by more than the standard deviation of 2.03 sit-ups per person.

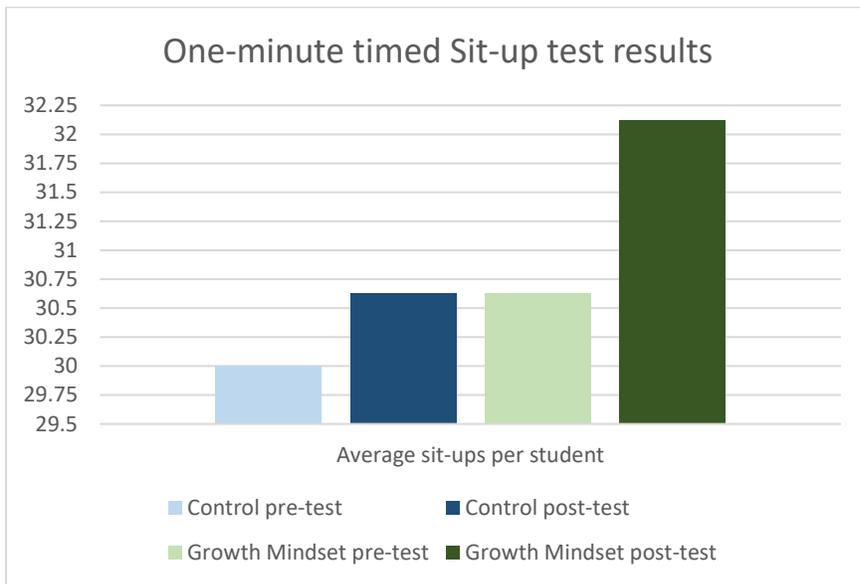


Figure 6. One-minute timed sit-up test results graph.

Discussion

Summary of Major Findings

When it comes to the research at hand, a few themes were discovered. Growth mindset intervention had a positive impact on student self-efficacy in physical education class. About 17% of students that received growth mindset intervention/instruction changed from a negative or neutral connotation with physical activity outside of physical education class to a much more positive outlook. Students that received growth mindset intervention also saw the largest increase from pre- to post-test when it came to if they believed whether they had the ability to improve their skills/abilities. An increase of 20% for the strongly agree choice for the post-test survey for the growth mindset intervention group showed a major change in student's perception of their abilities after growth mindset intervention had taken place.

Student achievement on presidential fitness tests however, showed mixed results. Growth mindset intervention proved marginally statistically significant when it came to student's performance on the timed mile run compared to the students that did not receive growth mindset intervention in between the pre- and post-test. However, results from the one-minute sit up test provided a little different conclusion. When it came to the one-minute timed sit-up test, there was a statistically significant difference in students that received growth mindset intervention compared to the students that did not in between the pre- and post-test.

Limitations of the Study

When doing a study centered around student performance and self-efficacy, different limitations can arise. Some can have a greater impact on the research than others, but all can play a minor role in impacting the outcome or skewing the results. When thinking about the research done in this study, a few different themes develop. Elementary school students are so young, and

their brains/bodies are changing rapidly. A student's self-efficacy towards physical education could be changing based on their exposure to more physical education/physical fitness or the activities that are being performed since the original pre-test survey, it may be completely unrelated to the growth mindset intervention. This also leads into the performance of students. Students may be improving based on the growth mindset intervention, or it could be the impact of more practice/activity and exposure to physical activity that they have had since the original pre-test.

Another couple factors can be contributed to the research taking place at an elementary school. In elementary physical education, students are not required to wear certain athletic apparel or shoes, meaning many students are not properly equipped to perform at their highest-level right from the get-go. With students being so young, a student's ability to fully comprehend growth mindset versus a fixed mindset comes in to play as well. They may not truly understand the intervention they received. On the contrary, with growth mindset being so popular in education, other students could be receiving growth mindset instruction/intervention in other classes even though they were in the control group for this study. Lastly, many elementary students do not fully understand what type of stress their body is physically capable of handling and are afraid to give their best effort in fear of being called a "try hard" or "teacher's pet". A few students skewed results by walking most of their mile run. Some did it during the pre-test, making their post-test score much easier to improve on.

A few other limitations are more random and unrelated. As mentioned above, the weather outside on the day of the post-test mile run was about 30 degrees colder with 20 mph winds, both of those factors could play into slowing down the students. Even if the weather itself may not slow down or speed up the student, it could change the mood/motivation of the student

which could drastically affect the outcome of the test. Student performance could also be impacted by things happening in their home life, at school earlier that day, or just their overall mood for the day. As many teachers are learning, there are so many factors that can play into a student's success/learning.

Further Study

With growth mindset continuing to be such a buzz word in education, and truly a lack of research centered around how it affects student achievement, more research needs to be conducted on the topic and how it can affect performance. Research beyond just a few fourth-grade classes should be conducted when it comes to growth mindset affecting performance. Selecting an older population to receive growth mindset intervention would alleviate the lack of understanding growth mindset versus fixed mindset amongst those receiving the intervention. A larger sample size by expanding to different schools, grades, and content areas would provide greater information towards proving the correlation between growth mindset instruction/intervention and student achievement. Controlling some of the minor variables such as type of intervention, age of students, length of time receiving intervention, etc. could play a contributing factor to pupil self-efficacy as well as performance. The more research that is done, the greater the chance to see the correlation between growth mindset and student self-efficacy as well as achievement.

Conclusion

With more and more research being conducted around how mindsets can impact a student's beliefs and achievement, this study is a small step towards greater understanding. Student mindsets and achievement are continually analyzed and evaluated throughout the world. It is vital for all educators to have the knowledge about growth mindset instruction and how grit can impact student learning, giving all students an opportunity to succeed at their highest potential. In this study, results showed that growth mindset intervention can positively impact student self-efficacy and may impact achievement as well. Certain limitations make the intervention process seem like it may not be the only thing impacting the fourth-grade students that were tested, demonstrating a need for more research to be conducted. The lack of time the study covered could potentially impact factors out of the researcher's control, calling for a need to continue research over a greater length of time to analyze the interventions true impact over time. However, with numerous studies already conducted and showing the impact growth mindset intervention and grit can have on student mindsets and achievement, it is a topic that will continue to garner a lot of research. Further indicating that the results from this study could play a minor role in that research.

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