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Abstract

The main goals of this study were to determine if student growth mindset impacted achievement and motivation and to see if gender and ethnicity made a difference in the type of mindset a student possesses. The study was conducted in a suburban middle school in Georgia with a predominantly white population and above-average socio-economic status. Ninety-five students from four 7th grade social studies classes took part in the eight-week study. The results from the study showed that there was no statistically significant relationship between mindset gains and academic gains; however, there was a strong positive, statistically significant relationship between mindset gains and motivation gains. These results indicated that motivation could be the linking factor between mindset and higher academic achievement.

The push for providing a more personalized learning experience for students has allowed educators to gain a better understanding of how their students learn and what factors drive student engagement and achievement (Nagle & Taylor, 2017). To tailor learning specifically for a student, a teacher must first understand how that student learns and what drives their motivation. Mindset, or Implicit Theory of Intelligence, refers to one's belief of whether or not their intelligence is malleable (Aditomo, 2015). There are two general types of mindsets: growth and fixed. Students with a fixed mindset believe that their intelligence or talent is natural or something that they are born with and cannot be changed. People with a fixed mindset tend to have a difficult time handling challenges and setbacks. Students with a growth mindset believe that with hard work they can improve their intelligence and are invigorated by challenging situations (Zeng, Hou, & Peng, 2016). Some see growth mindset as two separate ways of thinking while some see them as opposite ends of a continuum (Aditomo, 2015). Teachers can heavily influence and shape a student's mindset based on their motivation strategies and types of feedback that they provide. Understanding the mindset of a student can aid teachers in creating a truly personalized approach to learning because teachers know how that student perceives learning potential.

Carol Dweck introduced the concept of mindset in 2006. She defines mindset as how a person perceives their ability or intelligence (Dweck, 2006). She believes that fostering a growth mindset cannot only promote improved academic achievement and increased student motivation, but it can be beneficial for anyone in a leadership role trying to increase productivity. Dweck's theory is based on the belief that mindsets are learned and that by teaching students how the brain works and by using certain strategies, like cooperative learning and positive education, teachers can heavily influence a student's growth mindset. Yeager et al.

(2016) echoed Dweck's beliefs by exploring the importance of growth mindset in upcoming high school freshmen. Prior research has shown that students who are not successful in their freshman year of high school are less likely to be successful in later life. The study used design thinking to improve growth mindset interventions and tailor them specifically for students making the transition to high school. The researchers found that the intervention improved students' reactions to setbacks and lowered fixed mindset attitudes. Researchers reported a high fidelity of implementation and found that the interventions increased student performance by an average of four points. Although this study needs to be replicated to increase reliability, the findings are promising in supporting the premise that design thinking interventions are a solid way to strengthen student growth mindset.

Growth Mindset Strategies and Student Achievement

Since Dweck's introduction of mindset, researchers have been interested in what drives a person's mindset and how students with growth versus fixed mindsets respond differently to certain situations. Aditomo (2015) researched whether mindset plays a role in one's response to setback and why some students handle setbacks well while others do not. The study surveyed 123 Indonesian university students who enrolled in an advanced statistics course. Their beliefs about academic ability, intelligence, and goal orientation were measured at the beginning of the semester, and, one week after the mid-term grades were received, researchers measured effort attribution and de-motivation. The study found that neither growth mindsets about academic ability or intelligence had an effect on final grades; however, there was a positive relationship between growth mindset about intelligence

and growth mindset about academic ability. Hans et al. (2017) completed a similar study using 123 school-aged students to see how easily they could bounce back after a setback. The surprising trend was that growth mindset was related directly to the student's age. Older students typically had a stronger growth mindset than that of the younger students and reported higher accuracy in the exercise than the students who had a lower growth mindset level.

Schmidt, Shumow and Kackar-Cam (2015) conducted a study that examined the effects of a program called *Brainology* on students' perceptions of growth mindset and their abilities in the science classroom. Researchers also measured teacher impact on the success of the program, based on time spent teaching the material and how it was administered. The participants of this study were 363 middle school students from a diverse school district. All students were given pre- and post-surveys to measure goal orientation, malleability of intelligence and interest in science. Results from the study found that there was a significant correlation between time spent by the teacher on the intervention and the gains that the students made, pointing to the assumption that the more time a teacher spends on growth mindset interventions, the more likely their students are to have higher achievement in science.

Another program called *My Learning Essentials* uses cooperative learning skills to enhance student growth mindset and student engagement (Blake & Illingsworth, 2015). The basis of this program is giving students the opportunity to apply what they have learned in a group setting by taking turns facilitating discussion and activities, while the teacher takes a less hands-on approach. The study focused on three skills, including critical thinking, communicating ideas, and

argument construction. Results from the study found that students tended to become overwhelmed by not having to arrive at a correct answer. However, they reported a 95% satisfaction rate with the overall experience and what they had learned. Researchers concluded that this finding was a good strategy for teachers to use to help students understand their learning habits in the classroom while strengthening growth mindset at the same time.

Impact on Motivation

Understanding what drives student motivation has long been a topic of research in the education community. Growth mindset and student motivation are closely related; therefore, it is important to understand what motivates or demotivates students in the classroom setting. After Dweck (2006) introduced the idea of growth mindset, researchers started looking for a link between student motivation and growth mindset. One study examined different motivation theories and how they impact student achievement and growth mindset (Marshik, Kortenkamp, Cerbin, & Dixon, 2015). Researchers used a lesson study approach, where they broke participants into groups and gave them anagram packets of varying difficulty and differently worded instructions. Groups were placed strategically in the room so that they could see how the different groups reacted to the other groups finishing time and ease of completion. The goal of this study was to see how students' motivation changed based on the difficulty of the task. While the results indicated no significant relationship between method of instruction and motivation, a relationship existed between degree of difficulty and motivation. Students who received the almost impossible anagrams reported significantly less enjoyment in completing the task than the students who received the easier material.

Student engagement and motivation are very closely linked. One study takes a look at three types of student engagement, behavioral engagement, emotional engagement, and cognitive engagement (Fredericks, Blumenfield, Friedel, & Paris, 2003). The researchers studied relationships between these different types of engagement and school outcomes. They also evaluated different school engagement measures and surveys. Data were collected in two different waves (1st wave $n=661$; 2nd wave $n=294$). Both samples were from diverse, urban, high poverty schools in Chicago, Detroit, and Milwaukee. The results showed that these scales were a reliable tool to use to gauge what the minimum level of school engagement should be that would produce positive outcomes in the school setting. This tool could help create a baseline for teachers to see if their students are engaged and motivated. The research from this study has played a role in the creation of many school engagement surveys and programs, such as the School Engagement Scale and the Motivation and Engagement Scale (Fredericks et al., 2011).

Teacher Feedback and Reporting Procedures

Other research suggests that the way teachers assess student performance also plays a part in whether students have a fixed or growth mindset. Hans et. al (2017) discusses the importance of parent and teacher feedback and reporting procedures by stating that oftentimes parents and teachers feel the need to comfort students when they make mistakes, but, in reality, students need specific feedback about the mistake and encouragement to conquer the task again. The way teachers assess student performance can impact student motivation and mindset in sometimes unintended ways (Masters, 2014). This article explored three different

approaches to assessment and providing feedback. The first approach was providing success experiences. The belief is that if students are given tasks where they are likely to succeed, then learning will become a more positive and enjoyable experience, thus strengthening their growth mindset. Many educators and researchers, including Carol Dweck, argue that this strategy does more harm than good by creating students who are entitled and who associate learning with having to put forth little to no effort.

The second strategy was judging performance against standards (Masters, 2014). This approach was created in response to the inadequacies of the first strategy. Standards give students clear expectations from the beginning, and students are assessed based on how they show mastery of these standards. The limitation of this strategy is that it can promote a fixed mindset because there is a clear pass or fail mentality.

The third approach was assessing growth over time (Masters, 2014). This strategy provides a more personalized learning experience for students because it focuses on their growth over a period of time starting from their point of readiness, instead of judging their mastery of concepts at the same rate as all other students. This form of assessment is one of Dweck's suggestions for teachers who are trying to strengthen their students' growth mindset. Teachers' beliefs and their own mindsets influence student mindset and achievement (Blackwell, Trzesniewski, & Dweck, 2007). Students are perceptive to how their teachers view their abilities, and this perception can have a direct impact on their own perceptions of what they are capable of doing.

A study by Hanson, Ruff, and Bangert (2016) explored the importance of creating a growth mindset-centered school culture. They suggested that this construct consists of three factors, collaborative planning, shared leadership, and open communication and support. The goal of this study was to determine a difference in school cultures among school levels. They surveyed 347 faculty and administrators from P-12 schools in a large northwestern state. They used the What Makes Schools Work (WMSM) survey to measure school culture, and using a one-way ANOVA found that the mean score on the WMSM was higher for elementary schools than secondary schools. meaning there was a difference in school culture among school levels. More research needs to be conducted; however, this research leads to the conclusion that stronger school cultures foster stronger growth mindsets.

Gender and Growth Mindset

Researchers often assess how constructs like gender, ethnicity, and socioeconomic status impact an outcome. There has not been a great deal of research on how gender impacts growth mindset in a school setting. However, Macnamara and Rupani (2017), conducted a study of 103 college level psychology students to investigate whether there was a link between gender, intelligence, and growth mindset. There were 57 female participants and 46 male participants. Students completed several questionnaires dealing with demographics, intelligence, and mindset. After filling out the questionnaires, students answered questions from Raven's Advanced Progressive Matrices, which measures fluid intelligence. Researchers concluded that there was no significant relationship between mindset, intelligence, and gender. However, there were three-way interactions meaning that the constructs of mindset, intelligence, and gender were linked in several cases, but there was not enough evidence to conclude that more intelligent females have a stronger

mindset than other females or males for that matter. This findings was very interesting research because it contradicted what most educators and researchers would typically believe to be true, which is that intelligence and mindset are directly related.

Grit and Resilience

Grit is another term that parallels mindset. Grit refers to "the amount of passion and perseverance people have as they work toward long term goals when they face problems or hurdles that impede their progress" (Hochanadel & Finamore, 2015, p. 47). People who have high levels of grit do not let challenges or setbacks keep them from attaining their goals. Hochanadel and Finamore (2015) argue that to be successful in school, a student must have more than talent and intelligence, stating that students with higher levels of grit and determination will be more apt to succeed than students who are simply intelligent with no grit. They discuss the importance of understanding what mindset a student possesses and how to set the environment to develop and strengthen both grit and growth mindset. Yeager and Dweck (2012) also believe that growth mindset and resilience are closely related and have an impact on how students handle various transitions and challenges. Their research concluded that by teaching strategies using the incremental theory, students were better able to handle stress over long periods of time and were more likely to have a growth mindset. More supporting research suggests that students who have a growth mindset are also less likely to possess feelings of shame and more likely to feel pride in what they do, especially at school (Cook, Wildschut, & Thomaes, 2017).

Teachers who understand how the brain processes information are more capable of providing a true personalized learning experience for their students. The process of setting the environment is divided into two steps (Fitzgerald & Laurian-Fitzgerald, 2016). The first step is Relaxed Alertness. This step describes a learning environment where students can feel safe both physically and emotionally, as well as one where all students are challenged appropriately. Step two involves a student-centered approach to learning. Fitzgerald and Laurian-Fitzgerald (2016) argue that in order to foster true student engagement, students must actively participate in the process. Being able to face challenges and move past them are the foundation of having grit and resilience.

Positive education is teaching students with the goal of not only preparing them academically, but socially and emotionally as well (Zeng, Hou, & Peng., 2016). Zeng et al. (2016) studied the impact of growth mindset on student engagement and psychological well-being, focusing particularly on the attribute of resilience. Resilience can be defined as "the capacity to cope effectively with past and present adversity" (p. 2). This study included participants from five primary and middle schools in the Guangdong province of China. The schools represented a diverse sample as they are from varying age ranges and school types. Over 1,000 students participated in the study, completing surveys that measured their growth mindset, school engagement, resilience, and psychological well-being. The researchers found that there was a strong, positive correlation between all the variables, meaning that the data supported their hypothesis that growth mindset in fact positively correlates to school engagement, resilience and psychological well-being. This information can be very helpful to teachers or other researchers who are trying to understand how growth mindset relates to different areas of student development.

Another study advanced the notion of growth mindset, grit, and resilience by researching how cooperative learning strategies impact a student's willingness to work through setbacks and challenges (Laurian-Fitzgerald & Roman, 2016). In the introduction to their study, Laurian-Fitzgerald and Roman (2016) discuss that after interviewing several CEOs from around the world they found that many students were graduating college ill-equipped to handle the rigor of the business world. They asked them what it will take for students to be successful in careers of the future, and they agreed that candidates need to be creative problem solvers, resilient, and able to work and communicate with many different types of people in many different situations. Laurian-Fitzgerald and Roman wanted to research how cooperative learning skills could impact a student's mindset even at an early age. The study was conducted in a first-grade classroom ($n = 30$), where students were taught three basic social skills to use in cooperative learning groups. Their purpose for conducting the study was to see to what extent cooperative learning skills affect social skills as well as the mindsets of the students. They found that students did show growth in their social behaviors at the end of the eight weeks. At the beginning of the study, nine students scored in the growth mindset category, but, by the end of the study there were 16 students in the growth mindset category, showing a 30% decrease in the number of students with a fixed mindset.

Challenges and setbacks are a part of life no matter what a person's age. The current research suggests that the teachers' use of motivation strategies and proper reporting procedures play a major role in strengthening and promoting healthy growth mindsets. Evidence supports the proposition that teachers should be teaching students in a more comprehensive manner and providing the most personalized learning experience possible for each student.

Purpose

A student's mindset can be a major determining factor in their overall school success. Through motivation strategies and changing the way they give feedback to their students, teachers can help their students develop and strengthen a healthy growth mindset. The first goal of this study was to determine if there is a relationship between a student's mindset and academic achievement and motivation. Understanding growth mindset can help teachers, administrators, and parents provide a more enriching and positive learning experience for students of any age.

There are many factors that have an impact on whether a student has a fixed or growth mindset. This study also examined whether there was a relationship between gender, ethnicity, and a student's mindset. Students and teachers have no control over these variables. However, understanding how they impact student mindset can allow teachers to pinpoint students who might need extra growth mindset mentoring.

Method

Participants

The study was conducted at a public middle school in suburban north Georgia. The school demographics were relatively similar to that of the entire county, with the majority of students being White and from upper middle-class families. The median income in the county was $88,816, and the percentage of residents with a high school degree or higher was 92% (census.gov). The population for the entire county was 221,009,

and it is one of the fastest growing counties in the nation.

The school population was approximately 1,200 students in Grades 6 through 8. The demographics of the school were 14% Asian, 2% African American, 9% Hispanic, 72% White, with the remaining 3% being other races (Forsyth County Schools, 2017). The school was located in an area with high socioeconomic status, with only 10% of students qualifying for free and reduced lunch. There were 95 participants from four 7th grade social studies classes. One class was on-level students, two classes were gifted, and one class was English to Speakers of Other Languages (ESOL). All students were between 12 and 14 years old. The demographics of the classes were as follows, 67% White, 23% Asian, 4% African American, 2% two or more. The participants included 39 males and 56 females.

Measures

Student achievement was measured using a 30-question pretest developed by the 7th grade social studies teachers at the school in alignment with the seventh grade social studies Georgia Standards of Excellence, covering geographical, political, historical, and economic understandings of Africa, Southern and Eastern Asia, and Southwest Asia. The test was made up of multiple-choice questions and map labeling tasks. The pretest was administered on the second day of the study, and the same test was administered as a posttest after the eight-week growth mindset intervention took place.

Students' growth mindset was measured using the Dweck Mindset Instrument (DMI). The DMI is made up of 16 item statements and is measured using a six-point Likert Scale with 1 being *strongly agree* and 6 being *strongly disagree*. The item statements are written in a way that allows students to reveal their beliefs and feelings about their intelligence based on whether or not they agree or disagree with the statement. The DMI is intended to measure students' viewpoints of their own mindset and academic achievement. The DMI was administered to students immediately before taking the pretest at the beginning of the study and was administered again at the end of the eight-week growth mindset intervention. There are two types of questions on the questionnaire. The fixed intelligence item statements were 1, 2, 4, 6, 9, 10, 12, 13, and 14 (P'Pool, 2012). These statements dealt with the notion that talent and intelligence are unchanging and are scored at face value rather than being reverse coded. The incremental intelligence item statements were 3, 5, 7, 8, 11, 15, and 16. These statements dealt with attributes that can be changed and, thus, scores are reverse coded. The scores are then averaged together to get two scores, one for talent and one for intelligence. Students who received scores between 1 and 2 believe that their talent and intelligence are fixed and unchangeable. Students with scores of 5 through 6 have a strong mindset and believe that their talent and intelligence can grow with hard work and determination. Students with a score of 3 or 4 are undecided and do not have a definite belief as to whether their intelligence and talent are malleable. Research suggests that this instrument has good reliability with a Cronbach's alpha of 0.87 and that it stands up to a variety of potentially confounding variables, such as social desirability and intellectual ability (De Castella & Byrne, 2015).

The School Engagement Scale (SES) was used to measure student engagement and motivation. It is comprised of 15 statements that students rate on a five-point Likert scale

with one being never and five being all the time. This instrument has good reliability with a Cronbach's alpha of 0.82 (Fredericks et al., 2003). It was administered at the beginning of the semester and again at the end of the eight-week growth mindset intervention to determine if there was a change in the level of student motivation after the treatment. Students are scored in three different areas, behavioral engagement, emotional engagement, and cognitive engagement with higher scores meaning higher levels of engagement. All instruments are included in the appendices.

Procedures

Four 7th grade social studies classes participated in the study. One class was on-level, two were advanced/gifted classes, and one class was ESOL. At the beginning of the nine-week block, students were administered the pretest, DMI, and the SES to collect initial data. The MINDSET*KIT,* developed by The Project for Education Research that Scales, was used as a framework to develop lessons that teach growth mindset to students (MINDSET*KIT*, n.d.). There are five categories of growth mindset learning in the MINDSET*KIT*, and, over an eight-week period, students received lessons based on these categories for 15 minutes a day, two days a week during their study hall period. These unit lessons were created for each category, and very specific subtopics relating to each category were addressed within each lesson. Each unit lasted approximately two days.

Unit 1: About Growth Mindset. In this unit, students were introduced to what growth mindset is and how it affects them as students. The ideas of growth mindset versus a fixed mindset were discussed, and students brainstormed the implications for each way of thinking. Students explored research articles explaining how having a growth mindset could affect their achievement positively. Students were also introduced to the idea that mindsets can change. Students watched an interview with Carol Dweck, the pioneer of growth mindset research, where she explains in-depth how mindsets can change.

Unit 2: Teaching a Growth Mindset. In this unit, students explored the area of neuroscience and learned why it is important to understand how the brain works. Students participated in a project-based learning activity for the majority of this lesson that helped them understand how their experiences and mindset can affect many areas of their life, not just their academic success. At the end of the project, students completed a reflection assignment where they discussed their feelings on the project and what they learned about growth mindset. These reflections were not used as quantitative data, but copies were recorded for supplemental support.

Unit 3: Praise the Process, Not the Person. In this unit, students were introduced to a new feedback and reporting system. The teacher explained the research behind methods of feedback and reporting and how they can either help or hinder development of growth mindset. The teacher modeled the feedback and reporting procedures that were implemented for the remainder of the intervention. Students then completed a small group activity where they were given different social scenarios and collaboratively figured out how to give feedback that aligns with the growth mindset principles. Students then participated in a group discussion with the teacher where they voiced their feelings about different ways of reporting and types of feedback that they find helpful and those ways that they find detrimental to their growth mindset.

Unit 4: Celebrate Mistakes. In this unit, students were introduced to strategies that help them embrace challenges and view mistakes as a learning experience instead of avoiding challenges and seeing mistakes as a setback. One of the goals of the MINDSET*KIT* is to help students become comfortable making mistakes. Students completed various in-class activities where they evaluated their mistakes and practiced viewing them positively instead of negatively. Students were then asked to take what they learned about mistakes and apply it to their personal lives. One of the 15-minute sessions was devoted to students sharing their experiences with making a mistake outside of school and how they embraced it and turned it into a learning experience.

Unit 5: Give Tasks that Promote Struggle and Growth. This unit was all about creating a challenging classroom environment that fosters growth mindset. Students were given open-ended assignments that required them to use their creativity and critical thinking skills to solve problems. Assignments were both academic and social in nature, and the teacher took on more of a facilitator role, guiding students in coming up with their own ways of problem solving instead of how they feel the teacher would want them to do it. Student engagement and motivation was also addressed in this unit. Students wrote a journal entry discussing their feelings and opinions toward school and extracurricular activities. These journal entries were not used as quantitative data, but copies were kept as supplemental material for the teacher.

At the end of the eight-week intervention period, students were administered the social studies posttest to measure achievement, which contained the same questions as the pretest given at the beginning of the study. The DMI and the SES instruments were given also to measure growth mindset and student motivation and engagement. These data were compared to the scores collected at the beginning of the study. All data were evaluated based on gender as well. Differences in the scores from the beginning of the study and the end of the study were analyzed to determine if there was relationship between student growth mindset, academic achievement, and student engagement and motivation. Differences in the scores between boys and girls were also evaluated to see if there was a relationship between gender and growth mindset.

Results

DMI Intelligence

The first goal of this study was to determine if there is a relationship between a student's mindset and their academic achievement and motivation. The DMI Intelligence gain score was tabulated by taking the DMI Intelligence score from the first survey and subtracting it from the second survey. The test gain score was tabulated by subtracting the pretest score from the posttest score. A Pearson correlation was conducted to test for a relationship between the DMI Intelligence gain score and the test gain score, and the results were not statistically significant, $p = .674$. There was no relationship between the intelligence mindset gains and student gains pretest to posttest. A Pearson correlation was conducted to test for a relationship between the DMI Talent gain score and the test gain score. These results were not statistically significant $p = .799$, and there was no relationship between talent mindset gains and student gains pretest to posttest.

A Pearson correlation was used to test to see if there was a relationship between the DMI Intelligence gain score and the SES Behavior gain score. The results showed that there was a statistically significant, strong positive correlation $p < .001$, $r = .611$, between the two gains, meaning that when one score is high the other tends to be high as well, or when one tends to be low, the other tends to be low also. The DMI Intelligence score shows how much of a growth mindset students have about their own intelligence while the SES Behavior score shows how well students behave at school. The results indicated that, when students had a higher DMI Talent gain score, they typically had more positive beliefs about their behavior. The descriptive statistics can be viewed in Table 1.

Table 1

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Intelligence Gain	0.2156	1.33738	90
SES Behavior Gain	0.0112	0.99552	90

A Pearson correlation was used to test for a relationship between the DMI Intelligence gain score and the SES Emotional gain score. The results showed that there was a statistically significant, strong positive correlation between the two gain scores, $p < .001$, $r = .543$, meaning that there is a strong relationship. The DMI Intelligence score measures how a student feels about their own intelligence and the SES Emotional score measures how emotionally connected to school a student is; therefore, the results showed that when the DMI Intelligence score was higher, then they typically had a higher emotional connection to school and vice versa. The descriptive statistics can be viewed in Table 2.

Table 2

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Intelligence Gain	0.2156	1.33738	90
SES Emotional Gain	-0.0551	0.75867	88

A Pearson correlation was used to test for a relationship between the DMI Intelligence gain score and the SES Cognitive gain score. The SES Cognitive score measures a student's attitude about their level of cognition or how well they process information at school. The results showed that there was a statistically significant, strong, positive correlation, $p < .001$, $r = .470$, meaning there was a relationship. Students who had higher DMI Intelligence scores typically had more positive attitudes about their use of cognitive processes at school. The descriptive statistics can be viewed in Table 3.

Table 3

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Intelligence Gain	.2156	1.33738	90
SES Cognitive Gain	-.0258	.79366	89

DMI Talent

A Pearson correlation was used to test for a relationship between the DMI Talent gain score and the SES Behavior gain score. The DMI Talent gain score measures how much growth mindset a student has about their talents and abilities. The results indicated that there was a statistically significant, positive correlation $p < .001$, $r = .383$, meaning that there was a relationship where when a student had a higher DMI Talent gain score, or more positive perceptions of their talent, they most likely had better attitudes about their behavior in school. Descriptive statistics can be viewed in Table 4.

Table 4

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Talent Gain	0.1736	1.58853	89
SES Behavior Gain	0.0112	0.99552	90

A Pearson correlation was conducted to test for a relationship between the DMI Talent gain score and the SES Emotional gain score. The results showed a statistically significant, positive correlation, $p < .001$, $r = .392$. This finding means that there was a relationship between the scores. When a student had higher levels of growth mindset about their talents and abilities, then they typically had a higher emotional connection to school and vice versa. Descriptive statistics can be viewed in Table 5.

Table 5

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Talent Gain	0.1736	1.58853	89
SES Emotional Gain	-0.0551	0.75867	88

A Pearson correlation was used to test for a relationship between the DMI Talent gain score and the SES Cognitive gain score. The results were statistically significant with a positive correlation, $p < .001$, $r = .413$. This finding indicated that there was a relationship where students with higher growth mindset in regards to their talents and abilities also had more positive attitudes about cognitive processes at school. Descriptive statistics can be viewed in Table 6.

Table 6

Descriptive Statistics

Construct	*M*	*SD*	*N*
DMI Talent Gain	0.1736	1.58853	89
SES Cognitive Gain	-0.0258	0.79366	89

The second goal of this study was to determine if there was a relationship between gender, ethnicity and a student's mindset. An independent samples *t*-test with gender as the grouping variable and the DMI Intelligence gain score as the dependent variable was conducted to test for a difference between the scores according to gender with no significance found, $p = .365$. An independent samples *t*-test with gender as the grouping variable and the DMI Talent gain as the

dependent variable was conducted to test for a difference between the scores according to gender, and the results were not statistically significant, $p = .517$.

To test for a difference between ethnicity and the DMI Intelligence gain score, an ANOVA was conducted with ethnicity as the grouping variable and the DMI Intelligence gain score as the dependent variable. The results were not statistically significant, $p > .05$, and pairwise comparisons showed no difference between students of any ethnicity involved in the study. Another ANOVA was conducted with ethnicity as the grouping variable and the DMI talent gain score as the dependent variable. The results were not statistically significant, $p > .05$, and pairwise comparisons showed no significant difference between students of any ethnicity involved in the study.

Discussion

In the current study, the first goal was to determine if students' growth mindset was related to their academic achievement and motivation. Contrary to Dweck's (2006) findings, the results of the current study showed that there was no relationship between students' growth mindset gains and their growth in academic achievement. However, the results did show a relationship between students' growth mindset gains and the growth of their motivation level in school. Aditomo (2015) found similar results regarding the link between growth mindset and motivation in his study. His study, however, showed that there were academic gains when students had higher levels of motivation and could handle setbacks because they had a growth mindset.

There was also a relationship between students' mindset growth about their

intelligence and their gains in emotional connectedness to school. Cook, Whildschut and Thomaes (2017) found similar results in their study, which tested for relationships between students' growth mindset about academic ability and feelings of shame and pride. They found a negative relationship between growth mindset and feelings of shame but a positive relationship between growth mindset and feelings of pride. This finding supports the idea that students who have a more positive outlook about their potential to grow academically typically have more positive feelings associated with school.

There was also a relationship between students' intelligence mindset gains and the growth in their attitudes about cognitive processes at school. Students who believe that their intelligence is malleable and can change with hard work and perseverance typically have more positive attitudes about cognition and learning while at school. DeCastella and Byrne (2015) also asserted that there is a link between growth mindset and cognition. They made the claim that although students might believe that intelligence is malleable, that they might not believe that they can actually change their own. The results from the current study were consistent with those findings from the aforementioned study in that students who had better attitudes about their academic abilities and their ability to improve their intelligence typically had higher motivation and achievement in school.

The current study also found a relationship between gains in students' mindsets about their talents and the growth in their attitudes about their behavior at school. There is not a great deal of prior research about the link between growth mindset and behavior; however, there are some articles regarding the neuroscience associated with

behavior and growth mindset. Ng (2018) explains the need for more research in this area based on what is already known about the neuroscience surrounding both of these constructs. More research could potentially support the idea that students who have a strong growth mindset typically will have better behavior at school because they respond better to intrinsic motivation. Students who had a higher mindset about their talents also were more emotionally connected to school and had better attitudes about cognition and learning. These findings were consistent with findings in other studies like Zeng et al. (2016) on the effects of growth mindset on student engagement and psychological well-being. That study also found strong positive correlations between growth mindset and student engagement.

The current study sought to determine if gender or ethnicity played a role in whether or not a student had a growth mindset. There was nothing in the results to support the claim that either gender or ethnicity had any influence on whether or not a student has a growth mindset. There is also not a great deal of prior research about the impact on gender and ethnicity on growth mindset. Replication of the current study or further research could be conducted to examine whether there is a relationship.

Limitations

The main limitation of this study was the length of time that was available to conduct the research. It would have been preferential to start collecting data at the beginning of the school year and conclude at the end of the year. From a teacher's perspective, it is very difficult to introduce and carry out a new program in such a short period of time and have it be successful.

Another limitation for the current study was the fact that the middle school where the research was conducted had already implemented a mindset program that the students did not enjoy. Students already had a preconceived notion about what mindset was, and many of the students were not open to learning about it in a different way. The results might have been different if the treatment had been carried out with students who had never been exposed to a mindset program.

Sample size was also another limitation. Having a larger, more diverse sample size might have made the study more successful. If the study could have been conducted school wide, or county wide, there would have been a more accurate representation of the population. This study could be replicated with a larger sample size and longer duration to compare results to see if these limitations have any effect on what the outcome would be.

Conclusion

The current study did find a link between students' growth mindset and their motivation. Student motivation is a major issue because their motivation level impacts other areas like academic achievement and social-emotional wellness. Blackwell et al. (2007) drew similar conclusions in their study about implicit theories and achievement. They found stronger relationships between growth mindset and motivation than they did between growth mindset and academic achievement directly. They concluded that motivation was the key link between growth mindset and academic achievement. What motivates students is constantly evolving, so it is important for educators to understand that implementing a successful mindset program can impact

student motivation positively in their classrooms and schools.

Future research could be conducted to further examine how mindset and motivation are related and whether motivation is possibly the determining factor in student achievement instead of growth mindset. This study also sheds light on the fact that schools should take a closer look at how successful their current mindset programs are. In the case of this study, students had been participating in the same mindset program since elementary school and had developed negative feelings toward the idea of mindsets; therefore, they were not as open to something new which in turn may have affected the success of the current study. If schools spend time making sure that they are implementing successful mindset programs, they are likely to see more favorable outcomes in other areas like academic achievement and motivation as well.

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