

Abilene Christian University

## Digital Commons @ ACU

---

Masters of Education in Teaching and Learning

Masters Theses and Projects

---

Spring 5-12-2023

# Anxious Times Call for Additional Goal Setting Measures: A Look at How Math Anxiety is Impacted by Setting Goals in an Algebra I Class

Raegan Palacio  
raeganjpalacio@gmail.com

Follow this and additional works at: <https://digitalcommons.acu.edu/metl>



Part of the [Science and Mathematics Education Commons](#), [Secondary Education Commons](#), and the [Secondary Education and Teaching Commons](#)

---

### Recommended Citation

Palacio, Raegan, "Anxious Times Call for Additional Goal Setting Measures: A Look at How Math Anxiety is Impacted by Setting Goals in an Algebra I Class" (2023). *Masters of Education in Teaching and Learning*. 61.

<https://digitalcommons.acu.edu/metl/61>

This Manuscript is brought to you for free and open access by the Masters Theses and Projects at Digital Commons @ ACU. It has been accepted for inclusion in Masters of Education in Teaching and Learning by an authorized administrator of Digital Commons @ ACU.

**Anxious Times Call for Additional Goal Setting Measures: A Look at How Math Anxiety is  
Impacted by Setting Goals in an Algebra I Class**

Raegan Palacio

Abilene Christian University

### **Abstract**

This study examined the impact that goal setting would have on Algebra I students' math anxiety by comparing a control group to a treatment group. Students took the Math Anxiety Survey (Godbey, 1997) as a pre- and post-assessment. The researcher taught a goal setting mini lesson at the beginning of the data collection period to the treatment group (Class B), and students set weekly goals for themselves in relation to Algebra I class. Students in Class B journaled weekly, and some students participated in focus groups depending on their levels of math anxiety. The qualitative data was analyzed using the constant comparative method to find themes, and the quantitative data was analyzed using descriptive statistics. The researcher found that while the quantitative data showed an overall decrease in students' math anxiety, students said that they did not feel that setting goals for themselves impacted their math anxiety at all.

**Anxious Times Call for Additional Goal Setting Measures: A Look at How Math Anxiety is Impacted by Setting Goals in an Algebra I Class**

“Math makes me cry.” “I’m not good at this.” “I’m afraid I’ll get the answer wrong.”

Each of these phrases, and others, I have heard before in my Algebra I class. Students have a million things going on in their lives, both inside and outside of school. Many different factors can contribute to students’ math anxiety in their math classes. These factors include components of the classroom environment like the teacher, their peers in the class, the types of assignments students are completing, or competition in the classroom. These factors may also include students’ mental health or their homelife. Students have plenty to think about between home and school, so how can teachers make simple changes in order to alleviate the anxiety that students are feeling in their math class?

During my year-long clinical teaching placement in an M.Ed. in Teaching and Learning program and as a student myself, I have seen and heard the struggles of my peers and students. I have seen the nervous faces and the nauseous looks, heard the negative remarks and the gloomy utters. I have tutored many peers and students who were struck with fear for their next assignment, quiz, or test. There was a point where I started to wonder, why the hatred for math? Where did this stigma that math is unbearable come from? Surely this is not a new idea, but what about math make people so tense? As I moved into the role of a clinical teacher, I began to see the toll, both mentally and academically, that this fear of math had on my students. As a teacher, my goal is to help students in their struggles. I began to research the fear of math to find potential solutions for my students. One that seemed easy enough was speaking about math in a positive way. I started to intentionally speak positively about math and made only encouraging remarks to struggling students. While I kept no record of this, my mind began to wonder about other

solutions. I wanted to find a more permeant solution for my students' fear of math that students could use for a long time, past the walls of my classroom.

### **Purpose**

According to Richardson and Suinn (1972), math anxiety “involves feelings of tension and anxiety that interfere with the manipulation of numbers and the solving of mathematical problems” (p. 551). Math anxiety can cause students to literally freeze up and become nervous or nauseous (Godbey, 1997). Math anxiety can overlap into students' everyday lives, but mainly manifests in their academic lives. Many researchers have proposed potential solutions to students' struggles, but many sources claim more research is needed to show each solution's effectiveness. In this action research project, I focused on the impact that setting academic goals had on high school Algebra I students and their math anxiety. My study addressed the effects that goal setting had on math anxiety by answering the following questions:

**Research Question:** How might Algebra I students' math anxiety be affected by setting goals for themselves in class?

**Sub Question:** What are student perceptions of the math anxiety and the impact of goal setting on their math anxiety?

During the time of this action research, I was a graduate student completing my year-long clinical teaching placement in a mid-sized Texas town with a population of about 127,000. I was placed at Kirby High School (all names are pseudonyms), one of three high schools in the district. About 1,800 students attend this school with the following racial/ethnic demographics: 13.7% African American, 40.6% Hispanic, 37.6% White, 0.7% Native American, 2.4% Asian, 0.2% Pacific Islander, and 4.9% Multiple Races. About 62% of students are categorized as

economically disadvantaged, and about 3% of students are English Language Learners or Bilingual.

### **Literature Review**

Math anxiety has been tyrannizing students for a long time. Not only do students suffer the symptoms of math anxiety, but many students see their math performance suffer, too. Students with math anxiety see negative effects on their problem-solving skills. This was attributed to a hindrance of perseverance (Jiang et al., 2021). Students with high levels of math anxiety tend to “give up” on problems quicker than those who have lower levels of math anxiety. Additionally, students with high levels of math anxiety tend to exhibit less cognitive reflection, meaning that they are less likely to learn from their mistakes (Jiang et al., 2021). Unfortunately, this situation is a two way street; students who have low problem-solving skills inherently tend to have high levels of math anxiety, as well (Dowker et al., 2016).

Limited problem-solving skills is not the only reason students see a decrease in math performance; some students with high math anxiety tend to be less likely to participate in class. This lack of participation causes students to fall behind, which in turn, causes their grades to decrease and math anxiety to increase (Dowker et al., 2016). Testing anxiety has also been linked to math anxiety, specifically in Latino students. Hashmi (2021) described a phenomenon called the “stereotype threat theory” (p. 85). Latino students were less likely to pursue careers in mathematics because they felt that they had less opportunities than other students. This mindset overwhelmingly caused math and testing anxiety in Latino students.

There are a myriad of different reasons students experience math anxiety including teacher, parent, and other miscellaneous factors. Teacher related factors first included the teacher experiencing high math anxiety themselves. The teacher may find alleviating math anxiety to be

difficult when they also struggle. The teacher speaking about math in a negative manner or insinuating its difficulty can influence students to believe they aren't capable of succeeding in math (Beilock & Willingham, 2014). The teacher may also have insufficient mathematical knowledge which can lead to misunderstandings and frustration (Beilock & Willingham, 2014; Mehmet & Hulya, 2021). Lastly, many teachers have insufficient time to complete lessons, which can lead to misunderstandings and frustration (Mehmet & Hulya, 2021).

Parents may also cause their students to feel math anxiety by emphasizing their grade over their understanding of the material (Mehmet & Hulya, 2021). If students feel that their grade is more important than their understanding of the material, they may strive to perform rather than master. Other factors that may heighten math anxiety symptoms include standardized testing (Mehmet & Hulya, 2021), general anxiety (Dowker et al., 2016), stereotypes about various characteristics (Hashmi, 2021), and learning disabilities (Mutlu, 2019).

Researchers and professionals alike have proposed many different alleviators and implementations to impede math anxiety symptoms. A few of the proposed methods include modeling positive attitudes toward mathematics (Dowker et al., 2016; Willis, 2010), including real-world examples in instruction (Mehmet & Hulya, 2021; Willis, 2010), teacher in-service training on math anxiety (Mehmet & Hulya, 2021), responding to student struggles and mistakes in a positive way, taking the time to explain ideas thoroughly to reduce frustration (Beilock & Willingham, 2014), "Writing Out" stressful thoughts (Beilock & Willingham, 2014; Dowker et al., 2016), and setting goals (Willis, 2010). Many of these proposed implementations are methods that teachers can utilize to help students rather than methods that students can do to regulate their own anxiety. Additionally, many of these are merely *proposed* methods and not

*researched* methods. More research would be necessary to determine the effectiveness of these methods.

Teaching students how to set goals for themselves with the intention of alleviating math anxiety has not been widely researched. Many researchers and professionals suggest that teachers implement goal setting in their classroom, but it has not yet been proven to work. Tucci (2018) compared a group of ninth grade students who experienced math curriculum that included goal setting and reflection techniques and a group of ninth graders who experienced a standard math curriculum. No statistically significant results that teaching goal setting and reflection strategies caused students' performance and motivation to increase were found (Tucci, 2018). Although, Sides and Cuevas (2020) found that elementary students who learned goal setting strategies saw an increase in their math performance. Similarly, Furner and Gonzalez-DeHass (2011) found that different types of goals caused math anxiety to increase or decrease.

Based on the existing research, I have determined that utilizing goal setting as a potential alleviator for math anxiety symptoms for Algebra I students has not been widely researched in the current literature. Many researchers who propose alleviators and implementations to prevent math anxiety symptoms say that more research is needed to validate their effectiveness. As I mentioned before, many currently accepted implementations are designed for teachers and not for students. Understanding the effectiveness of goal setting as an alleviator for math anxiety could be beneficial for students and teachers alike for creating a positive classroom dynamic.

### **Methods**

The following sections describe how I conducted my action research study. This study took place in two different Algebra I classes. One of the classes received a mini lesson about



goal setting strategies and wrote one goal per week for three weeks. Each student wrote a goal pertaining to this particular math class and how they might better themselves.

### **Participant Selection**

The participants in my study included students from two different periods in Algebra I, Class A and Class B. Class A was the control group and Class B received the intervention of setting goals for themselves. In Class A, 11 students, five male and six female, decided to participate. In Class B, nine students, three male and six female, decided to participate. I had one student leave the school in the middle of the study, so my results only account for eight students, two male and six female. In Class A, 71% of students are categorized as Hispanic, and 29% of students are categorized as White. In Class B, 63% of students are categorized as Hispanic, 27% of students are categorized as White, and 9% of students are categorized as Black or African American. Sixty-four percent of Class A and 75% of Class B were categorized as economically disadvantaged. Only students who assented and had parent consent participated.

### **Data Collection**

At the beginning of the data collection period, students were given a pre-assessment of their math anxiety. The survey questions were from the Math Anxiety Scale (Godbey, 1997). This scale consists of 10 questions, and each has a Likert scale from “strongly disagree” to “strongly agree”. Five of the MAS (Godbey, 1997) questions are positively framed questions, and five are negatively framed questions. Questions were randomized on the survey to prevent skewed data. Students received the exact same survey to take at the end of the data collection period as a post-assessment of their math anxiety.

For my second data collection method, I conducted a semi-structured focus group interviews using open-ended questions (see Appendix A) for Class B (Hendricks, 2017).

Interviews were audio recorded and later transcribed. I originally wanted to hold one interview for students who had very high levels of math anxiety, based on the MAS (Godbey, 1997), one interview for students with moderate levels, and one with very low levels. This would have worked with nine participants, with three in each group, but then I had one student leave in the middle of data collection. I decided it would be best to conduct two interviews, one for students with high math anxiety and one for students with low math anxiety. The interviews were about 20 minutes long containing four students based on their initial math anxiety scores from the MAS (Godbey, 1997).

Lastly, I collected journal entries from students in Class B where they recorded feelings, emotions, learning struggles, successes, etc. in relation to the impact that goal setting had on their math anxiety (Hendricks, 2017). Students completed one entry per week of the data collection period that lasted three weeks. They had the choice to write, draw or both, and were given specific prompts (see Appendix B) (Hendricks, 2017).

At the beginning of the data collection period, I taught Class B a 10-minute mini lesson about how to set goals for themselves. This mini lesson included instruction based on Doran's (1981) SMART Goals. Students then saw several examples of SMART Goals specific to their Algebra I class. Lastly students wrote their own goal every week along with their journal entry.

### **Data Analysis**

To analyze the data from the MAS (Godbey, 1997), each Likert scale answer was assigned a numerical value to assign a score to each student's survey. Negatively framed questions were scored as follows: "strongly disagree" was valued at a one, "disagree" was valued at two, "neutral" was valued at three, "agree" was valued at four, and "strongly agree" was valued at five. Positively framed questions were scored backwards. This is because I wanted a

low score to reflect low math anxiety and a high score to reflect high math anxiety. Scores ranging from 10-29 were considered “low math anxiety”, scores ranging from 30-39 were considered “medium math anxiety”, scores ranging from 40-50 were considered “high math anxiety”. Scores were analyzed using descriptive statistics, and graphs were created to display the data (Hendricks, 2017).

I transcribed focus group interviews and journal entries and coded them using the constant comparative method (Hubbard & Power, 2003). This included generating 10-15 level 1 codes from roughly the first 20% of the data by assigning categories that describe the general nature of the chunk of data (Tracy, 2013). Then I used the level 1 codes to analyze the remaining 80% of the data. Once all of my qualitative data was coded, I organized the level 1 codes into four larger categories, or level 2 codes, that synthesized the data further (Tracy, 2013). For each level 2 code, I recorded memos and organized the codes into an index. Throughout this process, I kept my codes in a codebook (see Appendix C). My codebook organizes the codes by type, includes their definition, and an example from my data.

### **Findings**

The following section details the findings of my three-week study on the impact that goal setting had on my students’ math anxiety. Quantitative data, collected using the Math Anxiety Scale (Godbey, 1997) as a pre- and post-survey, revealed that students in Class B, the treatment group, had lower math anxiety after participating in goal setting and journal entries about math anxiety. To visually present my quantitative findings, I utilized graphs that compare math anxiety scores between Class A and Class B. Analysis of qualitative data gathered from student journal entries and focus group interviews revealed four major themes. My findings include the following: students claim that goal setting had no impact on their math anxiety, students have

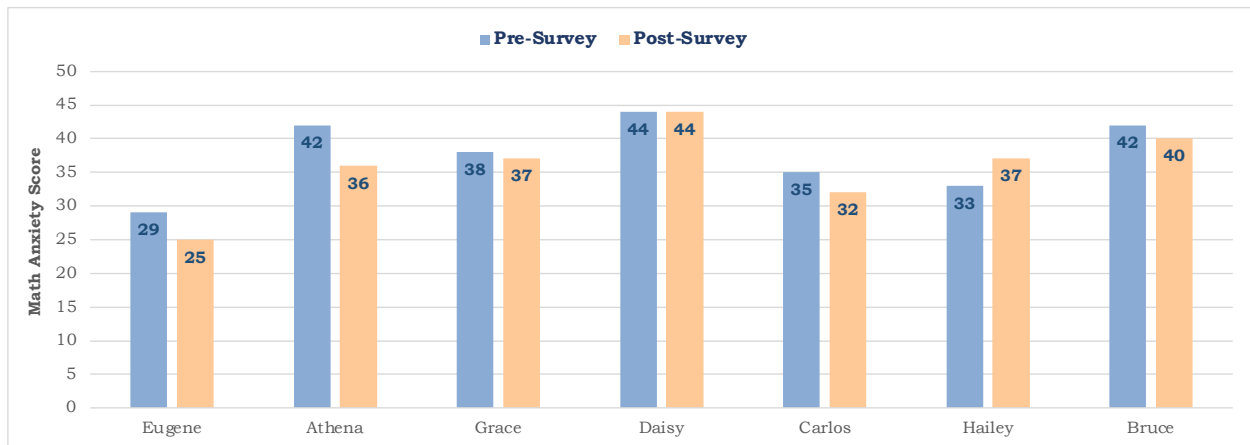
varied experiences with math, students may experience math anxiety from participating in class, additionally, and students may experience math anxiety for several other reasons. I used student quotes from their journal entries and the focus group interviews to illustrate student perceptions of setting goals for themselves.

**Math Anxiety Scale Scores**

Quantitative analysis from students’ MAS scores showed that Class B (the treatment group) reduced their math anxiety scores by almost three points on average throughout the study (see Figure 1). Only one student in Class B ended with a higher math anxiety score by four points but remained in the same score category. Additionally, one student had the same score for the pre- and post-survey. Class A increased their math anxiety scores by almost two points on average throughout the study (see Figure 2).

**Figure 1**

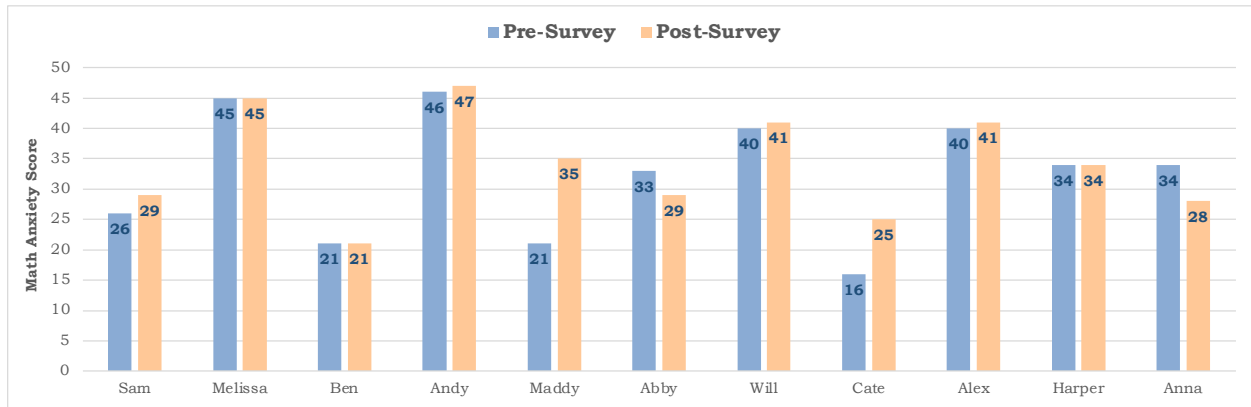
*Class B Individual MAS Scores*



*Note.* This figure represents students in Class A’s individual scores on their pre- and post-survey.

**Figure 2**

*Class A Individual MAS Scores*



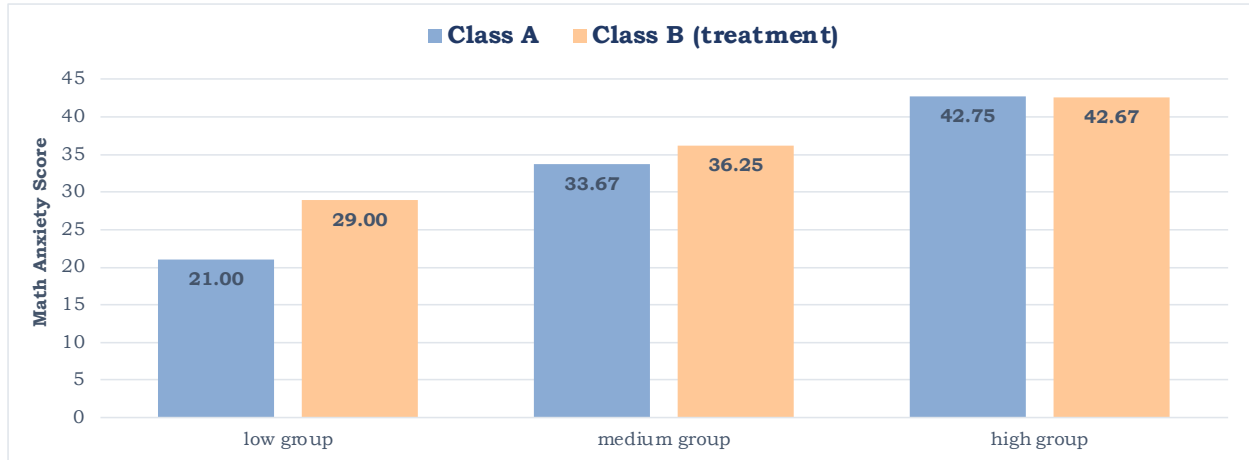
*Note.* This figure represents students in Class B’s individual scores on their pre- and post-survey.

In Class A, 55% of students ended with a higher math anxiety score. Twenty seven percent of students in Class A had a consistent math anxiety score throughout the study. Lastly, only 18% of students in Class A ended with a lower math anxiety score than they started with. One student decreased by four points, which moved them from the medium math anxiety group to the low math anxiety group. The other student decreased by eight points, which also moved them from the medium group to the low group.

Class B had 38% of students in the high math anxiety category initially, then only 25% of students in the category at the end of the study. Class A had 36% of students in the high category throughout the entire study. Class B started out with a higher average math anxiety score at 37.75 than Class A at 32.36. Class B also ended with a higher average score than Class A at 35.25 and 34.09, respectively. Yet, Class B decreased their average math anxiety score by 2.5 throughout the study, and Class A increased their average score by 1.73.

**Figure 3**

*Pre-Survey Average Group Score Comparison*



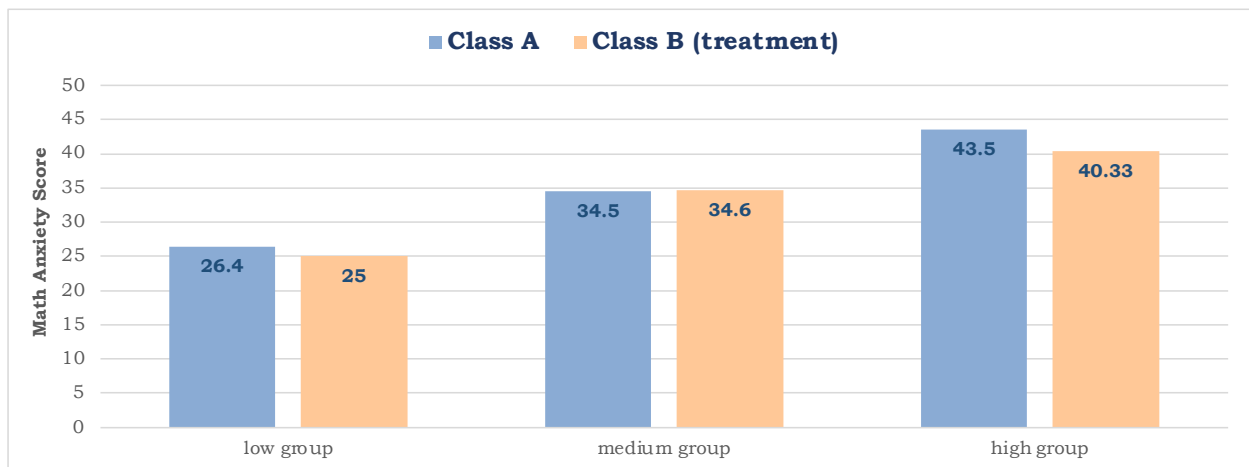
*Note.* This figure displays a comparison between Class A and Class B’s low, medium, and high groups of students’ average math anxiety scores for the pre-survey.

Average scores of each score group (low, medium, and high) were compared, as well, to see which class had lower scores per group (or which class the difference was in favor of).

Students in Class A initially had lower math anxiety scores than students in Class B per scoring group (see Figure 3), but Class B ended with lower scores than Class A (see Figure 4).

**Figure 4**

*Post-Survey Average Group Score Comparison*



*Note.* This figure displays a comparison between Class A and Class B’s low, medium, and high groups of students’ average math anxiety scores for the post-survey.

The average difference in the low group between Class A and B was 8 points in favor of Class A initially, then only by 1.4 points in favor of Class B. Initially, the medium group had a difference of 2.58 in favor of Class A, then a difference of 0.1 in favor of Class A. Lastly, the high group had a difference of 0.08 in favor of Class B initially, then a difference of 3.17 in favor of Class B.

### **Students Claim Goal Setting Had No Impact**

This theme is a direct answer to my sub research question, "What are student perceptions of the math anxiety and the impact of goal setting on their math anxiety?" In their interviews and journal entries, students concluded that setting weekly goals for themselves had no impact on their anxiety or feeling towards math; although, the quantitative data told a different story. A few students admitted that setting goals was somewhat of a relief. Athena said, "I think writing it down does help, not much, but it does help." She also said in her last journal entry, "When I try to set a goal or take it a little at a time, it helps slow my brain down." There seemed to be a couple students like her who claimed that setting the goals had an organizational effect on their brain. Carlos agreed when he said, "[Goal setting] actually really helped to like set myself like, 'I'm going to do this paper, like actually try and finish it.' It really helps." This organizational or relieving affect seemed to be the only mention of "good" that setting goals did for students. A few students mentioned that they forgot about their goals, so if they had remembered them throughout the week, they might have helped. During class time, I had several students make comments to me referring to their goals. Perhaps they only remembered their goals in class, but as soon as they left, they were not thinking about their goals. Bruce often mentioned his goals of finishing his work in class to me, and actually stayed a few minutes after class to finish worksheets we were working on.

While there were a few praises of setting goals, most of the students that I interviewed did not see the benefits of setting goals. Daisy said, "It's easy to set them but not to actually do them. It doesn't really have an impact on my anxiety because I already know I'm not going to do it." It appeared to some students, these journal entries and goals were like extra work that they had to do, even though it did not impact their grades or really have anything to do with the content. So, when I had students write their goals, they had a resistant mindset. I wanted students to reflect on themselves and find something that they would be motivated to work towards, which I detailed in my goal setting mini lesson, but some students still resisted the goals.

Other students, like Hailey, said, "It hasn't impacted me a lot because it's never really on my mind until I like look back at it." I had several students say they forgot about the goals throughout the week or had already decided that they were not going to do their goals mid-week. Bruce said, "I feel like since we only did it in a short period of time, we only just started two or three weeks ago, I feel like it didn't really do much because it was only for Algebra." Because students were only thinking about goals for one class, as they moved through their day, they tended to forget. Perhaps if students set goals for themselves in all of their classes, they would be more willing and motivated to work towards them. It seemed like they only remembered the goals when I verbally reminded them about their goals, or when they got to Algebra class. More frequent reminders, maybe even visual reminders, may have helped students remember their goals and stay more motivated to work towards them.

### **Varied Experiences with Math**

Throughout interviews, journal entries, and goals, students described the myriad of experiences that they have had with math, both positive and negative, relating to math class, math anxiety, and understanding math. Many students described negative experiences in math in



their journal entries. Eugene even said that "Algebra is the bane of [his] existence." Students used words like "stressful", "overwhelming", "cluttered", "complicated", and others to describe their negative experiences with math. When asked what about math makes students anxious or nervous, a theme throughout the interviews was mixing the letters and numbers can overwhelm their brains. Additionally, some students said that having to remember a bunch of formulas was stressful. Algebra I may be the first time that students see letter variables. Throughout elementary and middle school math, students do some basic algebra maybe with shapes, objects, or blank spaces to represent variables. So, in Algebra I, students may be overwhelmed with the new notation.

Interestingly enough, some of those same students described positive experiences with math. For example, Franklin said, "I know that I'm good at Algebra, so it's really not that much of a worry." Many of the students in this study were A or B students. Each student had many areas in Algebra that they did well in! Eugene said, "I've always had great teachers with math; all my teachers with math have always been great." Hailey expressed that she's improved throughout the years when she said, "Currently, math makes me feel way better at what I'm doing than before."

With split emotions from my students, it was difficult to interpret who enjoyed math or math class and who did not. Yet, students had several interesting conclusions about math anxiety and what causes it. Additionally, students seemed to be aware of why people have varied experiences. Grace said, "I think that people feel their own way about math; it's what they experience so like when people say that math is hard, it's because they're experiencing it; they're not just saying it because everybody else is saying it." This implies that math anxiety is not just a fad or trend among students. These are real feelings that students struggle with every day. Bruce

said, "We all have our different perspectives about it like, someone could be like, 'This is so easy, like how do you not understand how to do it?' But there could be another person in the class that has no idea what they're doing..."

Students seem to care very much about what their peers think, but it seems as though students do not follow the trends when it comes to their thoughts and feelings toward math. Students are also aware that others in the class may have math anxiety, as well. While this is not necessarily comforting, nor did it alleviate their anxiety, it seemed that students that I interviewed felt a sense of unity, like they could look out for each other. Overall, students shared many different stories and emotions about math through several data collection avenues. Many students seemed to have mixed emotions towards math. While some students made mostly A's and B's in class, they also often felt shame and embarrassment in math class. And, while some felt that math "is the bane of [their] existence", they also enjoyed math class, either because of the teacher or their friends in class. The main takeaway from this theme is that while a student's overall experiences can contribute to their math anxiety, one really bad experience can affect them for a long time afterwards.

### **Anxiety from Class Participation**

Students that I interviewed described several parts of class participation that cause them anxiety when it comes to math. Class participation refers to things such as asking for help, completing their work, talking in front of the class, the environment of the classroom, grades, the opinions of their peers, the presence of the teacher, the approachability of the teacher, and just being in the class in general. Each of these things caused most of the students in the study to have anxiety in some form or fashion. I learned that students would rather just not do their work at all than to feel embarrassed in front of their peers. Franklin said, "...it's being afraid of like

seeming stupid, but more when you're like interacting with people." Students absolutely hate feeling like they are dumb or being laughed at by their peers. Eugene said, "Kids are brutal, Miss, they're brutal." Students in Class B were terrified of their peers' and teachers' opinions of them. They tended to refrain from answering questions in class because they feared backlash or shame. They even named several students who were known to shame their peers in class for answering questions wrong!

I also learned that students may feel afraid to ask questions, like when Hailey said, "I've had teachers that didn't seem approachable, and I wouldn't want to ask questions, so I just never did..." Students are very conscious of teachers' opinions of them. Additionally, they are very aware of their teachers' moods and behaviors. If a teacher does not seem to have the desire to help their students, then students can sense that. When students feel like they cannot ask questions, they may lose the opportunity for clarification on a topic. Students may also be embarrassed about how often they are asking questions, like when Bruce said, "I don't want to be the only one, the odd person out, or they have to keep constantly coming over because I'm stuck on one or just two problems that I can't seem to get..." In this case, it may be beneficial for teachers to implement some sort of peer feedback system, so that students feel free to ask questions to their peers and neighbors, rather than catching a whiff of frustration from the teacher. We all know that students may ask lots of questions when learning a new topic. We want students to ask questions because that means they are curious about learning more, but they should not feel ashamed to ask those questions.

Lastly, many of my students have very high expectations for themselves to make good grades. Franklin said, "...knowing that I am good at math, and it comes naturally to me, it makes me think that I have no excuse for getting like B's and C's." These high expectations can be

harmful to students' self-esteem if they only view success as making an A rather than mastery of a topic. Many of my students' weekly goals were to make all A's on their homework or to make an A for the six weeks. This could be a good thing! In some classrooms, participation or completion of work can get you an A. In this case, "getting and A" would mean learning and participating in class. In other cases, "getting an A" may mean cramming knowledge in their brains just to lose it later.

Overall, many things about the classroom environment cause students' anxiety, and some of those things are difficult for the teacher to control, like peer opinions or students' expectations for themselves. Although, the teacher can control the culture of the classroom. One idea is to limit competition in the classroom. Grace wrote in her journal that she "feel[s] like [she's] in a competition with everyone in the class." Competition has proven to be a root cause of anxiety and should be limited in the classroom (Agarwal & Bain, 2019). Being aware of the environment and the culture of one's classroom is the first step to creating a safe space where students can learn.

### **Anxiety from Other Factors**

Some students made references to factors from outside the classroom that may affect how anxious they are inside the classroom. These factors include parents, students' high expectations for themselves, their homelives, other subjects besides math, their mental state, and their physical well-being.

Parents seem to play a large role in how students feel about math for many different reasons. Hailey said, "My mom would stand over me with a belt and tell me to do [my homework]." Now she has associated fear with math or her math homework. She also expressed frustration because "You get in trouble when you failed a paper because your parents actually

helped you on it." Many students felt that it was a never-ending cycle of fear, frustration, and punishment at home and at school. Other students, like Carlos, expressed that he "zoned out a lot" because "we can't visit my mom in Mexico, so I was thinking about her 24/7." When students are thinking about something sad, frustrating, upsetting, etc. they do not have room in their brains to think about other things, like their schoolwork. Students' homelives can affect their feelings and behavior in class. It is important to seek why students may be zoning out or starring off into space in class. If they are punished for this behavior, that can cause anxiety, which can then be associated with math anxiety. We all have family or outside issues to think about. We should allow students to have the space to process their feelings, as well.

As far as students having high expectations for themselves, Athena expressed that, "[She doesn't] want to get things wrong, so it's even harder." Carlos said, "I'm just scared to get my answers wrong, Miss. Or, that I did something before that wrong. Like it messes up the whole equation." It seems that students would rather not attempt questions than get them wrong. More research would need to be done into why this is, but Agarwal and Bain (2019) discuss how creating a risk-free classroom can be beneficial for students' fear of participation. Obviously, a completely risk-free classroom is impossible, but they offer ideas on how to implement a few strategies that will create a mostly risk-free environment. When students are allowed to make mistakes, learning is less of a battle.

### **Implications for Teachers**

The purpose of my study was to determine if goal setting had an impact on Algebra I students' math anxiety and to hear about their perceptions of math anxiety and goal setting. Students in two different classes took pre- and post-surveys to determine their levels of math

anxiety, while one class (Class B) participated in writing journal entries and setting goals for themselves. Lastly, students in Class B participated in focus group interviews.

According to quantitative data, students in Class B decreased their math anxiety over the course of the study. According to qualitative data, students revealed that they did not believe that setting goals for themselves impacted their math anxiety at all. A few students said they saw some benefits of goal setting like organizational and relieving effects, but the majority of students said they felt no impact, good or bad. Because quantitative and qualitative data illustrate opposing results, we can conclude that students may not immediately see the effects that setting goals had on them and their math anxiety. Qualitative data also revealed that students may feel math anxiety because of different class participation factors as well as factors outside of the classroom. Additionally, students may have many different positive and negative experiences with math, but even students with mostly positive experiences can still experience math anxiety.

While it seems that this intervention had a positive impact on students according to quantitative data, this study did have a few limitations. First, I did not have as many participants as I had hoped to have. If I had 20 or more students participate, I could have run inferential statistics to generalize the results to an entire population, like my whole school. Unfortunately, I did not have enough students in either class, so I can only generalize results to these specific classes. Additionally, I had a student leave school in the middle of the study. Therefore, I had to delete that student's data from the study.

Second, the data collection period was only three weeks. Therefore, I was not able to see the long-term effects of my intervention. Thus, I can conclude that the goal setting intervention only works short-term for my students. In fact, students even pointed out that they tended to forget their goals because they only set three. Maybe if the intervention was more consistent or

frequent, students would have remembered their goals. Additionally, students said they forgot their goals often because they only set goals for Algebra class. If all of the students' classes had participated in this intervention, the students may have been more inclined to remember their goals all day long.

This study has taught me a lot about what students are actually thinking. How often do we assume what students feel or think in teacher education classes or professional development? How often do we actually ask students their opinions or thoughts? In my experiences, it is not very often. Students revealed that competition in class gave them math anxiety. Several researchers have identified this issue like Agarwal and Bain (2019), yet we still tend to play competition-based games in class thinking it is just a fun game. In reality, these games can be a breeding ground for social or math anxiety for some students. Additionally, it may be rewarding to attempt to create a risk-free environment in the classroom. While a completely risk-free environment is impossible, eliminating unnecessary risks to promote learning can be beneficial. For example, if students are afraid to answer questions in class because they may be graded for their answer or ridiculed by the teacher or other students, they may not want to answer the question (Agarwal & Bain, 2019). Students mentioned this phenomenon in the focus group interviews numerous times.

I have also learned a lot about student perceptions of the approachability of their teacher. Many students revealed in their journal entries and interviews that they have previously felt uncomfortable asking their teacher questions either because they felt like their teacher did not like them or because they did not want to annoy their teacher. I believe that it is important to remind students that you are free and willing to answer questions, when applicable, so that they do not feel like a burden. It may even work to implement a peer-feedback system where students

know to ask their shoulder partner or group a question first before asking the teacher. This may leave the teacher less busy and less frustrated. This leads into the topic that students in this study expressed that more group work may be beneficial so that students know each other and are comfortable with each other. When students in the class do not know each other or are not comfortable with each other, they are less likely to collaborate. Additionally, they may be less willing to answer questions out loud. Having students collaborate also eliminates the risk of answering question incorrectly, alone.

As a result of my research, a few questions have emerged. First, because of the small sample sizes, I cannot generalize the results of this study to students outside of these classes. I would be curious to see if other teachers found similar results in their classrooms. Additionally, I would be curious to see if other proposed implementations ended with similar results for students' math anxiety. Willis (2010) proposed modeling positive attitudes towards math, responding to students' mistakes in a positive way, teacher training on math anxiety, and taking the time to offer students effective and timely feedback. Each of these propositions would be interesting to study in the classroom. There is little current research on testing individual strategies or implementations that could ease the strain of math anxiety.

Math anxiety affects my students and students everywhere, every day. Students deserve relief from the pressures of math anxiety, yet potential alleviators are under researched. Student success is our job as teachers. It is important that we strive to give students ample opportunities to succeed. Additionally, it is important that we guide students around and through obstacles that they may face throughout their time in our classes. Math anxiety can be a huge obstacle for students, so it is important that we seek to understand math anxiety and how we can reduce its effects on our students. My hope is that this paper inspires other teachers to research math



anxiety in their own classrooms and write about their experiences to further inform other teachers about how they may try to alleviate their own students' math anxiety!

### References

- Agarwal, P. K., & Bain, P. M. (2019). *Powerful teaching: Unleash the science of learning*. Jossey-Bass.
- Beilock, S. L., & Willingham, D. T. (2014). Math anxiety: Can teachers help students reduce it? Ask the cognitive scientist. *American Educator*, 38(2), 28–42.  
<https://eric.ed.gov/?id=EJ1043398>
- Doran, G. T. (1981). There's a S.M.A.R.T. way to write management's goals and objectives. *Management Review*, 70(11), 35–36.  
<https://community.mis.temple.edu/mis0855002fall2015/files/2015/10/S.M.A.R.T-Way-Management-Review.pdf>
- Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics anxiety: What have we learned in 60 years? *Frontiers in Psychology*, 7(508), 1–16. <https://doi.org/10.3389/fpsyg.2016.00508>
- Furner, J. A., & Gonzalez-DeHass, A. (2011). How do students' mastery and performance goals relate to math anxiety? *Eurasia Journal of Mathematics, Science & Technology Education*, 7(4), 227–242. <https://doi.org/10.12973/ejmste/75209>
- Godbey, C. (1997). *Mathematics anxiety and the underprepared student*.  
<https://files.eric.ed.gov/fulltext/ED426734.pdf>
- Hashmi, S. S. (2021). *The correlation between math anxiety, student placement, and academic achievement in mathematics among Latino high school students enrolled in Algebra 1 courses* [Doctoral dissertation, Northcentral University]. Northcentral University ProQuest Dissertations Publishing.  
<https://www.proquest.com/docview/2564445676/abstract/87B32883DFA9443EPQ/1>

- Hubbard, R. S., & Power, B. M. (2003). *The art of classroom inquiry: A handbook for teacher-researchers* (Rev. ed.). Heinemann.
- Jiang, R., Liu, R., Star, J., Zhen, R., Wang, J., Hong, W., Jiang, S., Sun, Y., & Fu, X. (2021). How mathematics anxiety affects students' inflexible perseverance in mathematics problem-solving: Examining the mediating role of cognitive reflection. *British Journal of Educational Psychology, 91*(1), 237–260. <https://doi.org/10.1111/bjep.12364>
- Mehmet, C., & Hulya, S. (2021). Factors that cause students to develop math anxiety and strategies to diminish. *Cypriot Journal of Educational Sciences, 16*(4), 1356–1367. <https://doi.org/10.18844/cjes.v16i4.5984>
- Mutlu, Y. (2019). Math anxiety in students with and without math learning difficulties. *International Electronic Journal of Elementary Education, 11*(5), 471–475. <https://doi.org/10.26822/iejee.2019553343>
- Richardson, F. C., & Suinn, R. M. (1972). The mathematics anxiety rating scale: Psychometric data. *Journal of Counseling Psychology, 19*(6), 551–554. <https://doi.org/10.1037/h0033456>
- Sides, J. D., & Cuevas, J. A. (2020). Effect of Goal setting for motivation, self-efficacy, and performance in elementary mathematics. *International Journal of Instruction, 13*(4), 1–16. <https://doi.org/10.29333/iji.2020.1341a>
- Tracy, S. J. (2013). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. Wiley-Blackwell.
- Tucci, A. E. (2018). *Self-regulation through goal setting and reflective practice: Impact on students perceived scholastic competency and motivation in ninth-grade mathematics classrooms*. [Unpublished doctoral dissertation, Western Connecticut State University].

Western Connecticut State University Education Dissertations Archive.

<https://westcollections.wcsu.edu/handle/20.500.12945/185>

Willis, J. (2010). *Learning to love math: Teaching strategies that change student attitudes and get results*. ASCD.

## Appendix A

### Focus Group Interview Protocol

1. Tell me about your experiences with anxiety in math classes or when doing math.
2. Why do you think you or people you know may become anxious when doing math?  
Explain.
3. How might what teachers or other people in your life have said about math affect your perceptions towards math?
4. What about math makes you or your peers anxious in math class?
5. How does anxiety in your math classes differ from anxiety you may feel in other classes?  
How is it similar?
6. Which statements from the questionnaire did you resonate with the most?
7. Tell me about your experience setting goals for yourself in math class.
8. What impacts did setting goals for yourself have on your anxiety in math?
9. If you had a good experience setting goals for yourself, how can you continue this to keep alleviating your anxiety in math?
10. What other techniques do you think might help you or others alleviate their math anxiety?

Questions may vary and additional questions may be asked depending on the answers of the participants.

**Appendix B****Journal Entry Prompts**

Write at least 3 sentences for each prompt or draw a picture. You may write more than 3 sentences if you need to, and you may write and draw if you wish. Drawing must be appropriate for school.

Journal Entry 1: Write at least 3 sentences or draw a picture about how math or math classes has made you feel in elementary or middle school.

Journal Entry 2: Write at least 3 sentences or draw a picture about how math makes you feel currently, either in this class or other math classes.

Journal Entry 3: Write at least 3 sentences or draw a picture about your experience with goal setting and its impact or lack of impact on your anxiety towards math.

## Appendix C

## Codebook

Level	Name	Definition	Example
2	Goal Setting Had No Impact	Some students indicated that they did not think that the goal setting interventions impacted their math anxiety at all.	“I feel like since we only did it in a short period of time we only just started 2 or 3 weeks, I feel like it didn’t really do much because it was only for Algebra.” (High Math Anxiety Interview)
1	Goal Setting was Relieving	A few students indicated that the goal setting intervention was relieving and helped to organize their thoughts.	“It’s just nice to get it off your chest. If you’re really struggling with something, and you don’t want to tell anyone, you don’t want to talk about with anyone, teachers, friends, counselors, it’s just kinda nice to be able to at least open up...” (High Math Anxiety Interview)
2	Varied Experiences with Math	Students indicated that they did not think their perceptions are influenced by their peers.	“I think that people feel their own way about math, it’s what they experience so like when people say that math is hard, it’s because their experiencing it, they’re not just saying it because everybody else is saying it.” (High Math Anxiety Interview)
1	Negative Experiences with Math	Students indicated that several negative experiences with math have caused them math anxiety.	“I get this but when you have to do this step, then you add another step, and you add another step it just gets confusing and then next thing you know I’m like the only person who doesn’t understand it, so you know, it’s a little difficult.” (High Math Anxiety Interview)
1	Positive Experiences with Math	Students indicated that positive experiences with math have helped to alleviate their math anxiety.	“Right now math is really easy and I enjoy Algebra and I get mostly A’s.” (Franklin’s Journal 2)

1	Understanding Math	Students indicated that their ability to understand the math that their doing contributes to their math anxiety.	“It’s just really hard for me to understand how to do simple math.” (Bruce’s Journal 2)
2	Anxiety from Class Participation	Students indicated that much of their math anxiety comes from participating in classroom activities.	“I usually only get anxiety with math if like a teacher were to call on my because sometimes, I don’t want to like sound like I don’t know what I’m talking about.” (High Math Anxiety Interview)
1	Anxiety Asking for Help	Students indicated that asking the teacher for help can cause them anxiety.	“I don’t want to be the only one, the odd person out, or they have to keep constantly coming over because I’m stuck on one or just two problems that I can’t seem to get.” (High Math Anxiety Interview)
1	Anxiety with Grades	Students indicated that their grades or the pressure to make good grades makes them anxious.	“I start rushing to finish which causes me to fail a test or a paper.” (Grace Journal 3)
1	Class Participation	Students indicated that they feel anxious about learning and completing their work in the classroom environment.	“I’d rather do it somewhere else, where I feel safe enough to like do it.” (Low Math Anxiety Interview)
1	Completing Work	Students indicated that the pressure to complete their work as fast as everyone else causes them anxiety.	“Everyone is already finished and I’m still working so my anxiety gets really bad” (Grace Journal 3)
1	Embarrassed to Participate	Students indicated that they often feel too embarrassed to participate in class because of what others might think.	“I feel like everybody is looking at me and thinking, ‘Wow, look at that weirdo.’” (Carlos Journal 3)
1	Peer Opinions	Students indicated that the pressures of their peers’ opinions of their intelligence or speed can cause them to feel anxious.	“I definitely don’t know you guys that well and so it’s like we all have expectations and perceptions of people from what we see of them in the classroom and how fast they finish and if they ever ask for help.” (Low Math Anxiety Interview)
1	Teacher Interference	Students indicated that their teacher’s approachability can affect their math	“I’ve had teachers that didn’t seem approachable, and I



		anxiety.	wouldn't want to ask questions, so I just never did." (Low Math Anxiety Interview)
2	Anxiety from Other Factors	Students indicated that non-classroom factors can affect their anxiety in the classroom.	"I think the way that people raise you, and the way that people react to things definitely impacts how you act the other way around." (Low Math Anxiety Interview)
1	Big Feelings Towards Math	Students indicated that prior or initial feelings towards math can affect their current feelings towards math.	"Math makes me cry. I dislike math a lot." (Athena's Journal 2)
1	High Expectations for Self	Students indicated that high expectations for themselves can cause math anxiety in the classroom.	"When I don't get good grades, it stresses me out even though that pressure is only coming from me." (Franklin's Journal 3)
1	Homelife and Parents	Students indicated that the state of their homelife or their parent's thoughts and actions can affect their math anxiety.	"I moved a lot. Well I moved a lot and had to visit my mom in Mexico, so I was thinking about her 24/7..." (Carlos Journal 1)