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A Growth Mindset Anxiety Intervention Among High Schoolers

Abstract: Abstract: Anxiety is the most common mental disorder among adolescents. In fact, 8-15% of American children and adolescents experience high anxiety (Muris & Steerneman 2001; Puskar et al. 2009). Certain demographic factors have been found to have correlations with anxiety. For instance, studies suggest that females experience higher levels of anxiety than males, starting at 13 years of age (Gillham & Chaplin, 2011);(Eaton, Dryman, & Weissman, 1991). In addition, people of low socioeconomic status (SES) have higher anxiety compared to those with higher SES (Bayram & Bilgel, 2016). One mental process which is related to anxiety, along with many other personal attributes, is mindset. Mindset is the belief that one's characteristics are malleable. A person with a growth-mindset believes they can change their characteristics with effort and new strategies, while a person with a fixed-mindset believes their characteristics are innate and permanent. The purpose of this project was to determine if there was a link between mindset and anxiety within a group of ninth grade high school students, and to develop and test the longitudinal effects of a growth mindset intervention on this group of students. The study also focused on the relationships between demographic features and, anxiety and mindset. Students were first administered an anonymous survey to collect demographic information and establish, anxiety levels, and anxiety mindset (fixed vs. growth). The sample was then split into a control group and an intervention group. The control group participated in a 20 minute online lesson about Greek Mythology, and the intervention group participated in a 20 minute original online growth mindset intervention. Six months later 90 of the 181 original students retook the survey. The study showed that girls had higher pre-intervention anxiety and were measured to be more fixed-minded than boys. Students from the lowest perceived SES had higher pre-intervention anxiety and were more fixed-minded than those of higher perceived SES. The intervention had a null effect on anxiety and mindset. Students in the intervention group did not have significantly different levels of anxiety or changes in mindset as compared to those in the control group. The study also found that pre-intervention anxiety predicted post-intervention mindset, while the inverse relationship was not shown.

Introduction

“Since I was really young I've struggled with depression and anxiety. I would cry almost every day and would have frequent panic attacks. I was completely hopeless. I would have never guessed I'd be here. Even now after years of hospitals, therapy, and medication I'm still fighting...” This is an authentic quote from a 14-year-old girl. Unfortunately, her arduous experience is not uncommon in our society. In fact, 8-15% of American children and adolescents experience high anxiety (Muris & Steerneman 2001; Puskar et al. 2009).

There are many different causes of and reactions to anxiety, and they can vary depending on the individual. People suffer from social anxiety, academic anxiety, performance anxiety, general anxiety and panic disorders ("Anxiety Disorders," n.d.). These feelings of stress, panic, and vulnerability can have an immense influence on one's daily functioning. It can influence academic achievement, vulnerability to sickness, social life, and overall mental health. Moreover, adolescents often react to their anxiety in destructive ways such as through drug abuse, delinquency, self-harm, or eating disorders (Silverman, 2008; Ossola, 2015).

How are some students able to flourish within a stressful environment while others seem to flounder? This can be explained by Carol Dweck's mindset theory: according to Dweck, mindset is defined as a person's implicit belief of whether or not characteristics are malleable (1995). Dweck believes that there are two general mindsets: growth, and fixed (Dweck & Leggett, 1988). Those who adopt a growth mindset believe that they can improve upon themselves and their characteristics by putting in effort and utilising different strategies (Dweck & Leggett, 1988). A person who adopts a fixed mindset believes that their characteristics are completely innate and that there is no point in trying to change them (Dweck, Chiu, & Hong, 1995).

Certain demographic factors have been found to have correlations with anxiety. For instance, studies suggest that females experience higher levels of anxiety than males, starting at 13 years of age. (Gillham & Chaplin, 2011); (Eaton, Dryman, & Weissman, 1991). There are a variety of reasons for this, one of which may be that females generally go through biological puberty before males. They can experience an abundance of hormonal changes during middle school where social challenges emerge (Simmons & Blythe, 1987). Girls are also more likely to be fixed-minded than boys. Dweck explains that they frequently interpret negative feedback and failure as indicative of low ability (1978). Furthermore, teachers and adult authorities responding to girls, are more likely to attribute their failures to lack of ability. While for boys, teachers are more likely to attribute their failures to lack of effort (McCarty, 2001). This is an example of how an external source can impact one's mindset. Boys and girls also have different coping mechanisms which can have an effect on their mindset. For instance, boys are more

likely to use distraction-based and problem solving methods when faced with an issue. Girls, on the other hand, are more likely to practice rumination. This is when someone focuses and dwells on their negative emotions and thoughts. Excessive rumination can lead to more fixed-minded thoughts (Broderick, 1998).

Socioeconomic status (SES) is a measure of the degree to which one feels that their environment supports them. Essentially, SES is a perception. Unlike a quantitative value, like financial income, socio-economic status is can be interpreted and reevaluated based on one's experiences. For example, Bayram & Bilgel's study questioned how much a participant felt that their school/education system supported them, and what national region they lived in, in order to measure their Socioeconomic status (2008). Bayram & Bilgel found that people of low (SES) had higher anxiety and concluded that when someone's perception of their environment lead them to believe that they had no access to helpful resources, or had little support from their school or community, they will feel higher anxiety when given difficult circumstances. Also, Claro et al. found that people of low SES were more likely to be fixed-minded, but that overall, despite their financial income, everyone with a growth-mindset of intelligence had an increase in academic achievement (2016).

Major stressors are embedded into our society, making it very difficult to diagnose and treat anxiety. Some of these influential factors include excessive standardized testing, (Paris, 1991) replacement of physical interactions with social media and virtual relationships, (Ossola, 2015) and various expectations of high achievement and performance (Luthar, 2016). Not only are these factors deeply ingrained into our society, they are actually increasing in prevalence; this evidently leads to increased levels of adolescent anxiety (Paris,1991; "Teens Are Feeling More Anxious Than Ever", 2016).

In order to react resiliently one has to confront their environment, and understand how it is personally affecting their emotions and actions ("Declining student resilience: A Serious Problem for Colleges", 2015). An overwhelming environment with various stressors, each of which are increasing in intensity can make resilience a nearly impossible feat. This is especially true for adolescents who are still experiencing physiological, social, and cognitive development.

While anxiety may seem most prevalent during adolescence, it isn't "just a phase." It can heavily impact one's mental health in adulthood as well (Pine, 1998). In fact, certain anxieties during adolescence can persist and worsen with age. This is why it is crucial to implement an effective treatment for adolescents with anxiety. If we can aid anxious teens when they are developing and transitioning into adulthood, we can potentially prevent them from experiencing the harsh long-term effects of anxiety ("Generalized Anxiety Disorder (GAD)" 2010).

Dweck believes that a person with a fixed mindset can learn to adopt a growth mindset. Dweck has applied the mindset theory to a variety of characteristics, such as intelligence, social status, physical

health, group malleability, depression, and personality (Dweck & Leggett, 1988; Dweck, 2008; Dweck, 1995; Blackwell, 2007; Yeager & Johnson, 2014; Halperin, 2011). She also realized that people's mindset can vary depending on the topic. For instance, one can have a growth mindset for intelligence, yet have a fixed mindset when it comes to overcoming social adversity (Dweck, Chiu, & Hong, 1995).

Several correlational studies have attempted to understand the relationship between a person's mindset regarding various personal characteristics (Dweck, Chiu, & Hong, 1995; Halperin, 2011; Blackwell, 2007; Kray, 2007; Kammarath & Dweck, 2006). For instance, how is a person's academic performance related to their mindset? How do people react to academic failure? Dweck, Chiu, & Hong found that those who had a growth mindset were more likely to re-evaluate their perspective or approaches to a situation before labeling themselves or the environment as the issue (1995). Kammarath & Dweck suggest that growth mindset aids people in managing conflicts and difficulties in relationships (2006). Halperin found that people with growth mindsets were more likely to compromise with other ethnic groups than those who had fixed mindsets (2011). Blackwell found that the growth mindset approach leads to overall better performance in the face of challenges such as difficult school transitions (2007). Kray found that the growth mindset approach can improve people's ability to successfully approach demanding business tasks (2007).

(Blackwell, et al., 2007; Hong, Chiu, Dweck, Lin, & Wan, 1999; Leggett & Dweck, 1988) found that people with a growth mindset of intelligence focused on learning goals, seeking to understand information in-depth, rather than focusing on performance goals such as getting good scores on tests. In addition, those who had a growth mindset felt challenged and motivated when faced with academic adversity rather than feeling helpless.

Blackwell created the first growth mindset intervention (2007). Blackwell's intervention differed from the "school assembly" format, which was found to be inefficient in making changes and a permanent impact on adolescents (Yeager & Walton, 2011). The goal of Blackwell's study was to examine how knowledge of the theory of intelligence is related to longer term achievement trajectories (Grade point averages) among 7th graders. A sample group and a control group with declining GPAs were studied and a growth mindset of intelligence intervention was given to a sample group, in the form of an eight-week workshop teaching adolescents about growth mindset, its effects, and strategies on how to adopt it. Throughout the intervention the growth mindset group showed a dramatic change of course and started a steep increase in their achievement trajectory. However, the control group continued to show declining academic achievement.

In Yeager's study, the goal was to find out how a fixed-versus growth-mindset of social status impacts stress, health, and academic achievement (Yeager and Walton, 2011). A sample of ninth graders

were given a 25-minute long intervention, encouraging a growth mindset of social situations, including bullying, exclusion, and making new friends. Differing from earlier intervention studies, Yeager's study was delivered by computer rather than on paper. The results were extremely positive; The growth-mindset intervention sample benefited from increased grades and physical health, along with decreased stress over the course of the year. Furthermore, Yeager's study showed that participants were able to change from a fixed mindset to a growth mindset.

Yeager and Walton (2011) suggested that these interventions would be most effective during transitional times, generally during middle school or at the beginning of high school. These are periods when adolescents are beginning to form opinions and develop values, and approaches to school and life are easily malleable. By combining an implicit message and a transitional period, the intervention is able to "plant the seed" of the growth mindset in the adolescent's mind. These interventions often include a self-reflection portion in which the participant can come up with ways to adopt the growth mindset. This allows the participant to gain ownership of the approach, and come to conclusions that are specific to their circumstances. The final key to these interventions is the role-model anecdotal quotes. Adolescents very often look up to role-models for guidance and inspiration (Yeager & Walton, 2011). By introducing anecdotes and quotes from older teens or celebrities, adolescents get the sense that the growth mindset is possible and encouraged by successful or experienced people (Yeager & Walton, 2011). Another aspect of the intervention is that students are given examples of how they can apply growth mindset to their daily life by encouraging certain steps or strategies.

Mindset intervention studies have shown a spillover effect. For instance, if someone learned and adopted a growth mindset toward social adversity, not only did it reduce their negative reaction to social exclusion, it also positively affected their academic achievement, their physical health, and stress levels (Yeager & Johnson, 2014). Similarly, if they try it out once or twice and have a positive experience, they are more likely to apply it to other aspects of their daily lives. For example, they try a new strategy and stay after school with a teacher before a test. If they see that this improves their grade, they will realize that they have self-control over their success. They then might decide to join a new extracurricular activity, despite their feelings of social anxiety. If they can improve their grades by trying something new, maybe they can improve their social life, too.

Mindset interventions have varied in their methodologies and efficacy. Some have had extremely successful results. Especially when applied to subjects like intelligence, depression and personality (Yeager & Johnson, 2014; Miu & Yeager, 2014; Blackwell, 2007). However, in 2016, David Yeager et al. did a growth mindset personality intervention which had null effects. The study compared the effectiveness of a lay theory intervention to other interventions including the growth mindset. Yeager et

al. found that surprisingly, the growth mindset intervention had a null effect, despite the fact that the exact intervention had been successfully used before (Yeager & Walton, 2011). They reasoned that the null effect may have been due to students of that specific school having prior knowledge of the growth mindset. The researchers reported that this may have hindered the effectiveness of the intervention. The authors also suggested that because the growth-mindset theory was presented as a private belief rather than the belief of the school, it may not have been effective. The students may have believed that the school itself still held fixed-minded values, and therefore, they felt obligated to assess themselves in a similar manner to the methods and values of the school.

Although there are no publications currently out discussing anxiety mindset interventions, there is information available analyzing anxiety mindset. Schroder, Dawood, Yalch, Donnellan, and Moser (2015, 2016) found a negative correlation between the growth mindset of anxiety, and symptoms of anxiety among college students, and female college students to have fixed-minded theories of anxiety. A survey was administered to 1,389 students. In addition, Schleider and Weisz (2016) did a study looking at how mindset and mental health issues among pre-adolescents correlated over the course of the year, and how that differed between sex. The authors found that there was a negative correlation between mental health issues and growth-mindset. However, their analyses suggest that a fixed-mindset does not predict mental health issues, but baseline mental health issues do predict mindset. (2016).

This study includes the first anxiety mindset intervention ever created and tested it on ninth-grade students in a multicultural suburban U.S. public high school. The intervention program was based on the structure of Yeager & Walton (2011) review of mindset interventions. This study looked at the relationship between mindset and anxiety within the entire group as well as the effectiveness of employing a mindset intervention to reduce anxiety levels. The study also analyzed the distribution of anxiety and fixed-mindedness across varying genders and socioeconomic status. These results will help to develop our understanding of a simple, time efficient, and affordable intervention techniques to aid adolescents with managing stress, further establish our knowledge of mindset interventions as a whole, and better understand the relationships between demographic features and anxiety mindset.

Methodology

In order to obtain a representative sample of ninth graders, the entire ninth grade class in a suburban U.S. high school was invited to participate in the study. Approximately 181 students were surveyed; 49% of the participants were identified as being white, 23% were African American, 15% were Hispanic and Latino, 10% of the sample ninth graders were Asian, Native Hawaiian, or Pacific Islander, and 3% were multiracial. In addition, 18% of students were eligible for free lunch, and 3% were eligible for reduced price lunch. (NYSED Data, 2013). The guardians of the ninth grade participants were sent an

email prior to the beginning of the school year which described the study and allowed them the option of excluding their child from the experiment. The intervention took place during science class. Cluster sampling was used; each science class was designated as either a control group or an intervention group.

Phase one of the study was administered during the first month of school. Before students began the intervention, the teacher administering the intervention made an announcement about participation. The teacher explained that the intervention was completely voluntary and that any student could opt themselves out at the beginning or discontinue their participation at any time during the intervention. They were also notified that there would be no penalty if they decided to opt out. Teachers were asked to refrain from voicing their opinion about the study or further explain the intervention to the students in any way, so as to avoid influencing the results. The teacher then distributed tablet computers, so each student got an individual tablet computer. The teachers then gave the students a link, that brought them to the questionnaire and intervention. Each student created a unique ID to maintain anonymity. The students were given prompts to generate a series of characters to enable them to remember their ID. For example, prompts included, “the first letter of your birth month,” and “the number of letters in your name.”

Once the ID number was entered, both groups answered a questionnaire. It consisted of a range of 38 questions to assess one’s own perception of their anxiety, whether they had a fixed-mindset vs. growth-mindset, gender identity, and perceived socioeconomic status (SES). The survey asked questions about anxiety and depression, using the accredited RCADS scale (Revised Children’s Anxiety and Depressions Scale) which measured anxiety on a scale of 0-75, 75 being the highest level of anxiety. Anxiety mindset was measured using the MSAMS scale (Michigan State Anxiety Mindset Scale), which measured mindset on a scale of 0-6, the higher the score, the more growth-minded the participant. The survey also measured for perceived socio-economic status, using a revised children’s SES scale. Note that the criteria for SES includes more than financial income. It ultimately indicates how much someone feels that their environment and the available resources support their present and future lifestyles. Some of the questions evaluating SES included: “How many cars do you own?”, “What is your estimated parental financial income?” “How much does your parents’ financial income limit your ability to go to college?” The survey portion took the students two to five minutes to complete. After they finished the online questionnaire the students individually read through a slideshow presentation. This is where the control group and the intervention group split. The control group observed and participated in a slideshow lesson about Greek mythology. The intervention group on the other hand, observed and participated in a slideshow lesson explaining how anxiety is malleable and that it is not biologically fixed, but something that can be changed due to personal efforts and the environment. Both slideshows consisted of approximately 14 slides. Once the slideshow had been fully viewed, the control group went on to writing

about two things they learned about how Greek mythology influences us today. On the other hand, the intervention group was asked to write to a theoretical younger student (middle schooler) about how they can change their anxiety and describe one or two steps they would use in the future to reduce their anxiety. This phase of the study lasted 20 to 25 minutes. A total of 181 students completed the Phase one portion of the study.

The phase two portion of the study took place six months after the phase one portion was administered. The students re-entered their individualized IDs and proceeded to answer a questionnaire identical to the one they took during the first semester. Phase two took six to eight minutes to complete. Ninety of the original 181 students completed the phase two portion of the study. This drop in participation is due primarily to confusion regarding the ID's.

T-tests, regression analyses, and two-way randomized ANOVA analyses were used to compare the means of self-reported levels of anxiety symptoms and mindset between varying genders and perceived SES, compare the means of self-reported levels of anxiety symptoms and mindset between the two conditions (anxiety intervention group and control group), examine the pre-intervention variables which predicted post-intervention anxiety and mindset, and finally, measure the contribution of the independent variables, condition (anxiety mindset intervention vs. control group) and time (pre-intervention vs. post-intervention), and their effect on the two dependent variables, anxiety symptoms and mindset.

T-tests were used to determine if two independent samples had means that differed significantly. In order to test this, a *t*-score is used to find the difference between the means relative to the standard deviation of the data. Therefore, a larger *t* value means a larger difference between two variables. A *p* value measures the significance of a statistic. The *p* value indicates the probability that the result is due to chance. Therefore, in order for a result to be significant, the *p* value less than 0.05 (less than 5% probability due to chance) as considered significant; a *p* value less than 0.01 was considered highly significant, and a *p* value less than 0.001 was considered very highly significant.

A one-way randomized ANOVA was used to show if a variable in at least one group differed from the same variable in multiple other groups. A larger F value would indicate that there is more variability between groups than within them, and could indicate a statistically significant difference exists, but a one-way ANOVA doesn't indicate which of the variations were significant. In cases where the ANOVA showed statistical significance, a post-hoc analysis was done after the ANOVA in order to view the differences between groups and isolate the specific variations which are significant, based on the *p* value.

The regression analysis was used to isolate the pre-intervention variables which predicted the post-intervention variables. The goal was to find out if pre-intervention anxiety or pre-intervention mindset could predict post-intervention anxiety or post-intervention mindset by themselves, without an environmental factor influencing the relationship between the six month break. Therefore, only data from the participants who were in the control group were examined. This guaranteed that there wouldn't be any interference by the the mindset intervention. In regression analyses, the beta coefficient indicates the slope of the line, and it can be either positive or negative. The *t*-value and significance (*p* value) measure the extent to which the magnitude of the slope is significantly different from the line laying on the null X-axis.

A two-way randomized ANOVA was used to evaluate how two independent variables, time and condition, affected two dependent variables, anxiety and mindset. The *F* values (MS between/MS within) and *p* values indicated the differences between groups, and the significance of those differences.

The terms pre/post-intervention are applicable to both control and growth-mindset groups. They indicate whether data was taken from the first assessment in September or the second assessment in March, after both the control group and intervention group completed their respective online lessons.

Results

The results of an independent group's one-tailed t-test, $t(178) = 5.19, p = .001$ of pre-intervention anxiety symptoms between genders are displayed in Table 1 and Figure 1. The prediction was that females would have higher levels of anxiety compared to males. The analysis suggests that the hypothesis was supported, showing that there was a significant difference between males and females, with females having higher anxiety.

Table 1: One-Tailed Independent Groups T-Test: Gender Differences in Pre-Intervention Anxiety

	Gender		<i>t</i>	<i>p</i>
	Females	Males		
Mean	13.78	8.14	5.19	.001***
SD	7.49	6.92		
Number	101	79		
Notes: * $p < .05$. ** $p < .01$. *** $p < .001$				

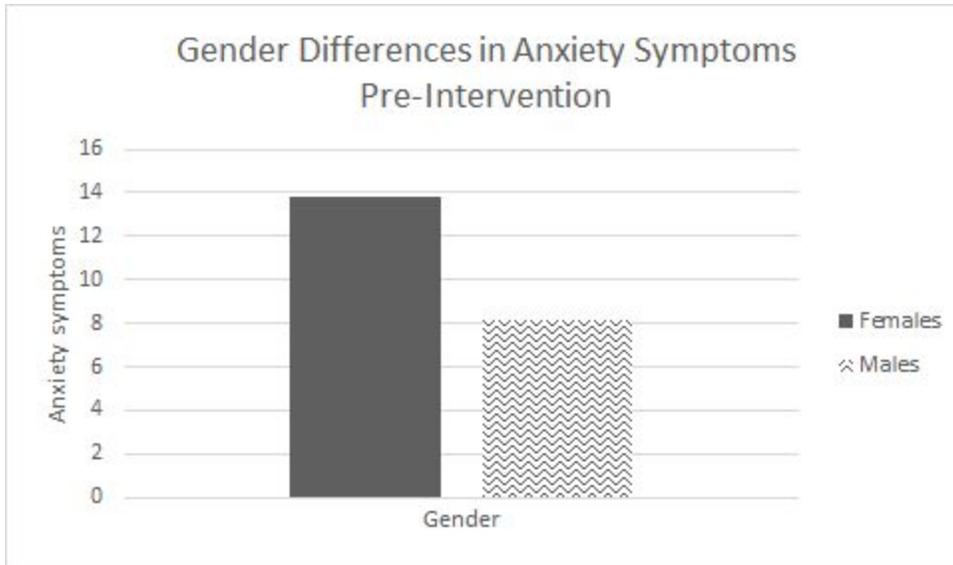


Figure 1: Gender differences in pre-intervention anxiety symptoms

The results of an independent groups one-tailed t-test, $t(178) = 2.94, p = .004$ of pre-intervention mindset between genders is displayed in Table 2 and Figure 2. The prediction that females would be more fixed-minded compared to males was supported, showing that there was a significant difference between males and females, with females being more fixed-minded.

Table 2: 1-Tailed Independent Groups T-Test: Gender Differences in Pre-Intervention Mindset

	Gender		<i>t</i>	<i>p</i>
	Females	Males		
Mean	4.02	4.50	2.94	.004**
SD	1.16	1.00		
Number	101	79		

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$

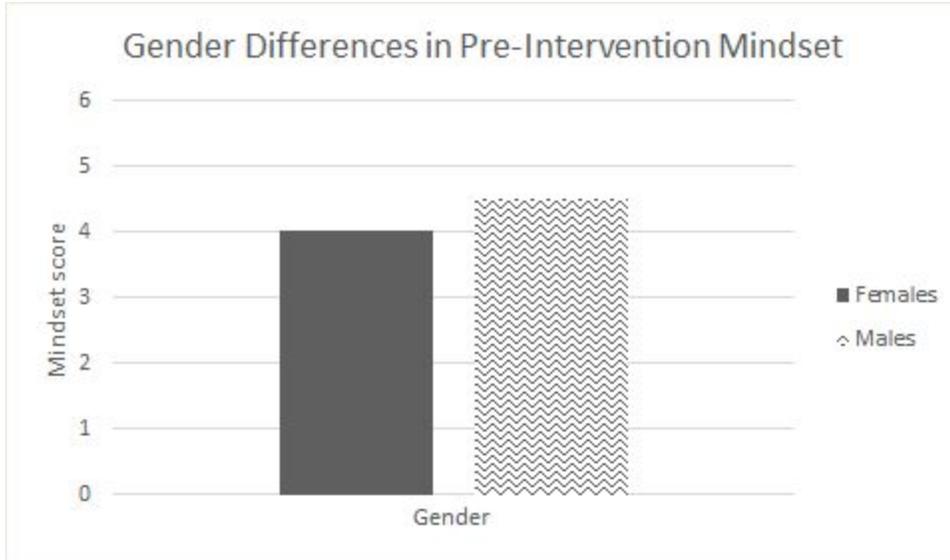


Figure 2: Gender differences in pre-intervention mindset.

Table and figure 3 are descriptive summaries of the perceived socioeconomic status (SES) differences in anxiety. Participants in the low perceived SES had the highest anxiety symptoms (13.7), followed by middle SES (10.6), and the high SES group had the lowest anxiety symptoms (9.7).

Table 3: Summary Table of Perceived Socioeconomic Status Differences in Pre-Intervention Anxiety

	Socioeconomic Status		
	Low perceived SES	Middle perceived SES	High perceived SES
Mean	13.68	10.64	9.70
SD	8.61	7.08	7.08
Number	65	58	60

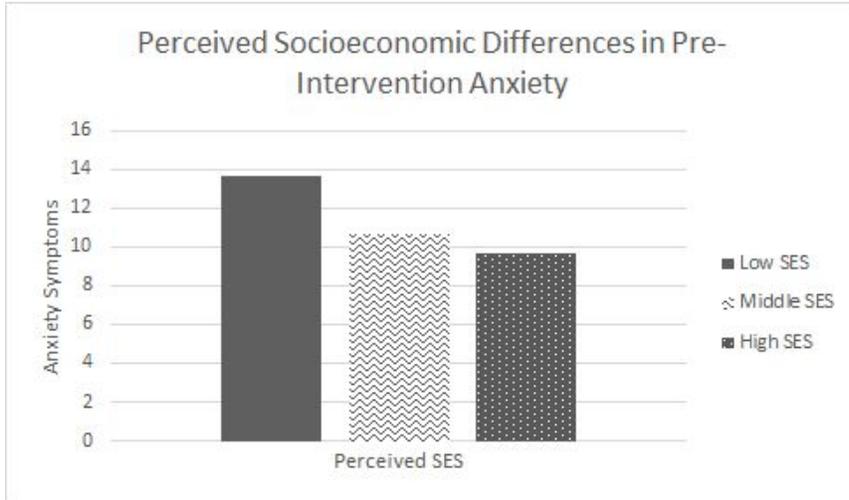


Figure 3: Perceived SES differences in pre-intervention anxiety

Table four is a one-way ANOVA analysis indicating a significant difference of anxiety symptoms between perceived SES groups: ($F(2, 180) = 4.64, p = .01$).

Table 4: One-way ANOVA Analysis: Perceived Socioeconomic-Status Differences and Anxiety

Source	df	SS	MS	F	p
Between-groups	2	544.050	272.025	4.64	.01**
Within-groups	180	10552.212	58.623		
Total	182	11096.262			

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$

A post-hoc analysis allows one to view the differences between groups and show which specific variations are significant, as shown in Table 5. The analysis found that the difference between anxiety in the low and middle SES is significant, ($p = .029$) along with the difference in anxiety between low and high SES ($p = .004$). However, the difference in anxiety between middle and high SES is insignificant ($p = .51$).

Table 5: Fisher's Least Significant Difference (LSD) Protected T-test Post-Hoc Analysis of Anxiety

Perceived SES groups			
	Low vs Middle SES	Low vs. High SES	Middle vs High SES
P Value	.029*	.004**	.51
Notes: *p<.05. **p<.01. ***p<.001			

Table and figure 6 are descriptive summaries of the perceived socioeconomic status (SES) differences in mindset. Participants in the low perceived SES had the most fixed-mindset (3.90), followed by middle SES (4.33), and the high SES group had the most growth-mindset (4.5).

Table 6 : Summary of Perceived Socioeconomic Status Differences in Pre-Intervention Mindset

Socioeconomic status			
	Low Perceived SES	Middle Perceived SES	High Perceived SES
Mean	3.90	4.33	4.5
SD	1.08	1.06	1.11
Number	63	58	60

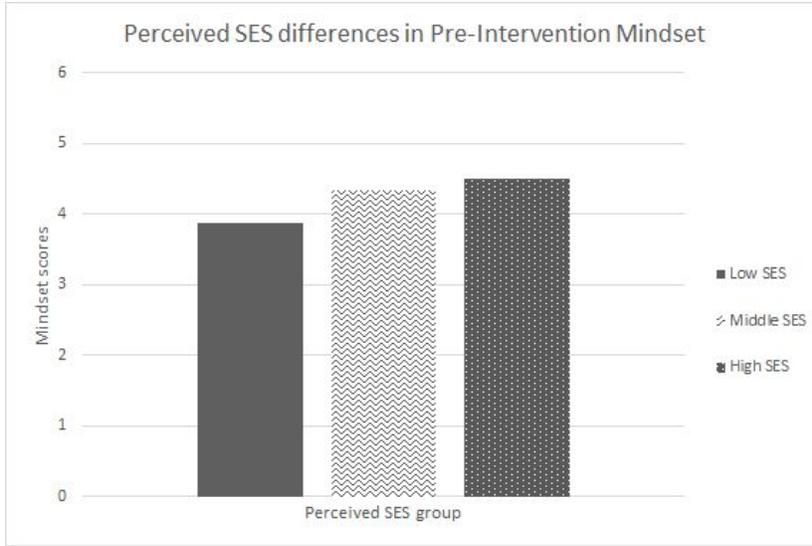


Figure 6: Perceived SES Differences in Pre-intervention Mindset

Table seven is a one-way ANOVA analysis indicating a significant difference of mindset scores between perceived SES groups: ($F(2, 178) = 5.58, p = .004$).

Table 7: One-way ANOVA Analysis: Perceived Socioeconomic Status differences in Pre-Intervention Mindset

Source	df	SS	MS	F	p
Between-groups	2	13.130	6.565	5.58	.004**
Within-groups	178	209.508	1.177		
Total	180	222.638			

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$

A post-hoc analysis allows one to view the differences between groups and show which specific variations are significant, as shown in Table 8. The analysis found that the difference between mindset in the low and middle SES is significant, ($p = .021$) along with the difference in mindset between low and

high SES ($p = .002$). However, the difference in anxiety between middle and high SES is insignificant ($p = .39$).

Table 8: Fisher's Least Significant Difference (LSD) Protected T-test Post-Hoc Analysis of Anxiety

	Perceived SES groups		
	Low vs Middle SES (post-hoc analysis)	Low vs. High SES (post-hoc analysis)	Middle vs High SES (post-hoc analysis)
P Value	.021*	.002**	.39
Notes: * $p < .05$. ** $p < .01$. *** $p < .001$			

Table 9 shows the Pearson Correlation between pre-intervention anxiety and growth mindset for the entire sample. A growth mindset of anxiety was negatively correlated with anxiety symptoms suggesting that students who are growth-minded are more likely to have low anxiety symptoms, and those who are fixed-minded are more likely to have high anxiety symptoms. This was found to be significant. ($p = .000$).

Table 9: Correlation Between Pre-Intervention Mindset and Pre-Intervention Anxiety

	Pre-intervention mindset	Pre-intervention anxiety
Pre-intervention mindset		
Pearson correlation	1	-.62
Number		181
Significance (p)		.000***
Notes: * $p < .05$. ** $p < .01$. *** $p < .001$		

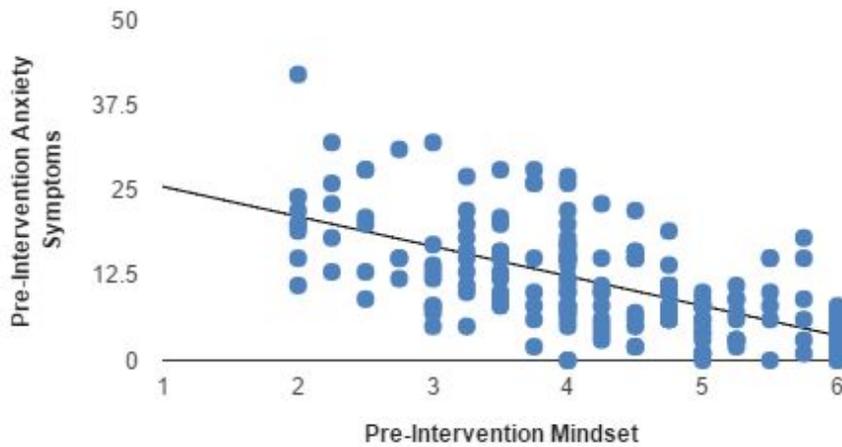


Figure 9: The Correlation Between Pre-Intervention Anxiety and Pre-Intervention Mindset

Table 10 shows that there are no significant differences between the intervention and control conditions for pre and post intervention mean anxiety symptoms and anxiety mindset. Figure 10a and 10b are the graphic representations of this table. Figure 10a shows the differences in pre and post intervention anxiety symptoms between the control and intervention groups. Figure 10b shows the differences in pre and post-intervention mindset for the control and intervention groups.

Table 10: T-Test table: Anxiety and mindset mean scores pre- and post-intervention

	Pre-Intervention	Post-Intervention
Control: Anxiety	11.49	11.33
Intervention: Anxiety	12.53	12.34
Control: Mindset	4.35	4.26
Intervention: Mindset	4.09	4.26

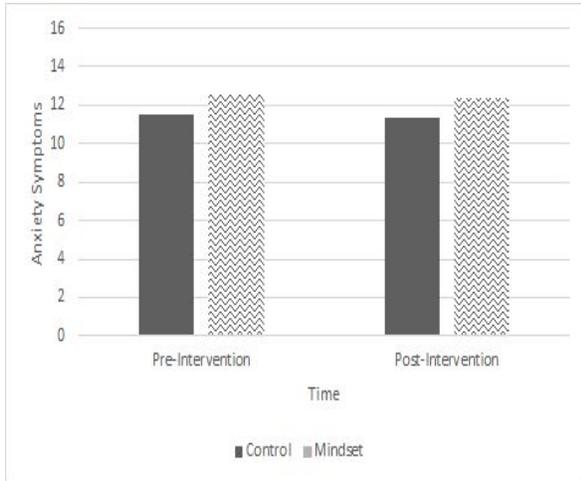


Figure 10a

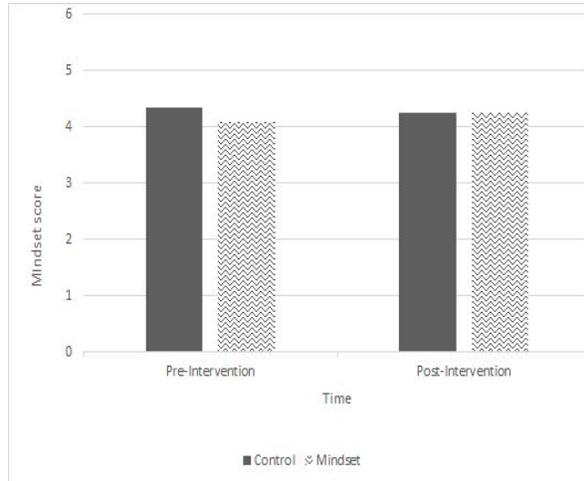


Figure 10b

Table 11 shows pre-intervention anxiety and pre-intervention mindset were entered into a multiple linear regression to predict post-intervention anxiety in the control group. Only pre-intervention anxiety was a significant predictor ($Beta = .56, p = .003$).

Table 11: Regression Analysis of Pre-Intervention Predictors of Post-Intervention Anxiety Symptoms

	Beta	<i>t</i>	<i>p</i>
Pre-intervention anxiety symptoms	.56	3.12	.003**
Pre-intervention mindset	.10	.53	.600

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$

Table 12 shows pre-intervention anxiety and pre-intervention mindset were entered into a multiple linear regression to predict post-intervention mindset, in the control group. Only pre-intervention anxiety was a significant predictor ($Beta = -.54, p = .003$).

Table 12: Regression Analysis of pre-intervention Predictors of Post-Intervention Mindset

	Beta	<i>t</i>	<i>p</i>
Pre-intervention anxiety symptoms	-.54	-3.13	.003**
Pre-intervention mindset	.05	.32	.754

Notes: * $p < .05$. ** $p < .01$. *** $p < .001$

A two Time (Time 1 vs. Time 2) by two Condition (Intervention vs. Control) repeated-measures ANOVA on anxiety symptoms is shown in Table 13. It revealed a nonsignificant main-effect of Time ($F(1, 88) = 0.06, p = .81$) as well as a non-significant interaction between Time and Condition ($F(1, 88) = 0.00, p = .98$).

Table 13: 2x2 ANOVA- Time vs. Condition for Anxiety Symptoms

Source	SS	df	MS	F	Sig.
Time	.141	1	1.41	.06	.81
Time*Condition	.01	1	.01	.000	.98
Error Time	2095.57	88	23.81		

A 2 Time (Time 1 vs. Time 2) X 2 Condition (Intervention vs. Control) repeated-measures analysis of variance (ANOVA) on mindset scores is shown in Table 14. It revealed a nonsignificant main-effect of Time ($F(1, 86) = 0.10, p = .75$) as well as a non-significant interaction between Time and Condition ($F(1, 86) = 1.35, p = .25$).

Table 14: 2x2 ANOVA- Time vs. Condition for Mindset

Source	SS	df	MS	F	Sig.
Time	.06	1	.06	.10	.75
Time*Condition	.76	1	.76	1.35	.25
Error Time	48.69	86	.57		

Discussion

Several relationships between demographic features and pre-intervention anxiety and mindset were found to be significant. For instance, due to the high and significant t value in the t-test ($t(178) = 5.19, p = .001$), on average, females were shown to be more fixed-minded and anxious compared to males. This finding is similar to that of Schleider and Weisz (2016) and Schroder, Dawood, Yalch, Donnellan, and Moser (2015, 2016).

In addition, due to the high and significant F value in the one-way ANOVA ($F(2, 180) = 4.64, p = .01$), the results show that the people with lower perceived SES, were also more fixed minded and

more anxious. Surprisingly though, the specific item of perceived financial income, which was one of the questions used to determine SES, did not have an effect on mindset or anxiety. This could be because the school used in this study encompassed a large range of household income and ethnicities; it was a comparatively “safe” environment. Consequently, even though some students knew they were not rich, they still felt that their school environment was exceptionally supportive. Therefore, those who truly had the perception of a low SES and an unsupportive environment were more likely to have fixed-mindsets of anxiety, and high anxiety symptoms. SES and gender were the only baseline factors that predicted anxiety and anxiety mindset. These findings are similar to those of Bayram & Bilgel (2016) and Claro et al., (2016). However, one must keep in mind that most 14-year-olds are unsure of their income, making this item less reliable.

In young high schoolers a fixed anxiety mindset was found to be related to higher anxiety symptoms. This can be shown by Figure 13. In the correlation analysis there was an R value of $-.623^{**}$ between pre-intervention mindset and pre-intervention anxiety. The r^2 of $.388$ indicates that 39% of the variance between pre-intervention mindset and pre-intervention anxiety is related. Ultimately, this means the more fixed-minded students were, the more likely they had high anxiety symptoms. This finding is similar to that of Schroder, Dawood, Yalch, Donnellan, and Moser (2015, 2016) who found the same inverse relationship among college students. In this study, the inverse relationship was supported across all levels of SES and gender.

The regression analyses showed that pre-intervention anxiety was a predictor of both post-intervention anxiety and post-intervention mindset. However, pre-intervention mindset was not a predictor of post-intervention anxiety. This finding is similar to that of Schleider and Weisz, which found that mental health issues in the beginning of the year predicted mental health issues and mindset at the end of the year, however, mindset at the beginning of the year did not predict mental health issues at the end of the year (2016). This result undermines the purpose of a mindset intervention. If in fact, mindset at one point cannot predict personal characteristics at a later point, then there is no purpose in trying to change someone’s preliminary mindset in an attempt to change their long-term characteristics. Ultimately that is the goal of a mindset intervention. However, one must take into consideration, that both studies had relatively small sample sizes, limiting the reliability of the findings.

As indicated by the null findings of the 2x2 repeated ANOVAS, inducing a growth anxiety mindset had no effect on anxiety symptoms or mindset six months later. The major question here is: why did this mindset intervention have a null effect? There are a variety of potential answers. To start, the wording and overall structure of the intervention could have had a negative effect on the participants. The intervention was written formally, in an attempt to make the growth mindset seem as official as possible.

However, maybe taking a more informal approach would have made the concepts and information more relatable. Perhaps if the “student quotes” section was put in the beginning of the intervention, the participants would have been more engaged from the start. The format of the intervention needs to continue to be modified in order to be as efficient as possible. Another potential reason for the intervention’s null effect, is that anxiety and other mental disorders can be a very sensitive topic. Many students may struggle with opening up about their anxieties and emotions. This could mean that it might take more than a 20-minute online intervention for kids to truly open up to changing their anxiety mindset. A successful intervention may require a more intimate workshop format, where an adult also speaks about anxiety mindset to students individually, or in small groups, similar to Blackwell’s 2007 intervention. Furthermore, an intervention that is reinforced periodically may be more effective, for example: a weekly reminder as a text, or a follow-up session online. The null effect may also be due to the long period of time between surveys. It’s possible that the intervention did have an effect however, the effect diminished before the six-month retest period. Another factor could be that it takes longer than six months for the intervention to have a real effect. Also a potential reason of ineffectiveness could be that mindset interventions are effective for most topics, but excludes anxiety. Finally, it may just be that past “successful” interventions did not control for the dependent variable prior to the intervention. For example they didn’t control for pre-intervention academic achievement, when they saw a positive relationship between pre-intervention intelligence mindset and post-intervention academic achievement.

For future interventional research, targeting anxious females and people of low SES is recommended as a way to better understand anxiety mindset, and its correlations with certain demographic features. In addition, the anxiety mindset intervention should continue be tested, modified, and polished in order to potentially have impactful and successful results.

Adolescent anxiety is an issue whose pervasiveness and severity is growing exponentially within our society (Bass, 2015). It’s crucial for us to continue studying adolescent anxiety, and assess which strategies and approaches give us the best perspective on how to minimize its symptoms. It would be very difficult to eliminate or reduce the effects of major stressors in our society. However, if people can learn how to manage, compartmentalize, and express their anxieties in healthy way, it is possible to decrease the high levels of mental health issues among this generation, and generations to come.

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