

Mindset and Academic Risk

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ABSTRACT

Research has shown that students with a growth mindset perform better academically than those who have a fixed mindset; however, there is little research currently discussing the factors that may cause the correlation between mindset and academic performance. This study aimed to identify academic risk-taking as a possible factor contributing to the relationship between mindset and performance. To accomplish this, a study was devised to measure the mindset and academic risk-taking behaviors of students. If a relationship was found between these two variables, then academic risk-taking could be a contributing factor to the established correlation. This study found that risk-taking and mindset are not related. Thus, academic risk-taking is unlikely to be one of the contributing factors to the relationship between mindset and performance. Due to this finding, mindset interventions that solely focus on encouraging academic risk-taking with the goal of promoting a growth mindset may not be effective. Researchers may want to consider conducting an observational study of the classroom in order to better measure the academic risks students take. Additionally, further studies should be conducted in order to find other possible contributing factors to the observed correlation between growth mindset and academic performance.

Introduction

The importance of one's education has grown considerably over the last century. Due to this greater importance, a more emphasis has been placed on academic performance than in previous decades. During the last couple of decades research has been conducted with the goal of finding factors that influence academic performance. Researchers have found that one of the largest influencing factors is mindset. The researchers' studies have shown strong correlation between mindset and academic performance. In education, mindset is typically categorized as either growth or fixed. Carol Dweck, a professor of Psychology at Stanford University, defines a growth mindset as the belief that one's most basic abilities are subject to change and can be improved on. Those with growth mindsets believe that success is a direct outcome of effort. Dweck defines a fixed mindset as the belief that one's abilities are predetermined and are not able to be changed (Dweck, 2006). Those with fixed mindsets believe that no amount of effort will change an outcome. Timothy O'Connor, a professor of philosophy at Indiana University, and Christopher Franklin, an associate professor of philosophy at Grove City College, state that those who have a growth mindset feel a moral obligation to improve their abilities, as their success depends on their effort, while those with a fixed mindset have little moral obligation to improve themselves, as they believe that their abilities cannot change.

Literature Review

Mindset's Role in Academic Achievement

One factor that affects academic achievement is the community context which one is surrounded by. Douglas Lauen, a professor of Sociology at the University of North Carolina, and Michael Gaddis, an assistant professor of Sociology

at the University of California, Los Angeles, explored the connection between academic performance and poverty context (percentage of students who qualify for free school lunch). They found that classrooms with high poverty context tended to have worse academic performance on average than classrooms with low-poverty context. While there is a direct correlation between poverty context and academic performance, Lauen and Gaddis conclude that family and community context, such as family life and the resources available to the school, have a greater impact on academic performance than a family's financial situation (Lauen et al., 2013). Additionally, research done by Portia Miller and her colleagues at the University of Pittsburgh in 2019 has shown that other community contexts, such as high levels of crime and unemployment, are directly associated with worse academic performance (Miller et al., 2019). Although high poverty context is correlated with negative impacts on academic performance, the studies done by Lauen, Gaddis, and Miller show that poverty context cannot always be used to predict academic performance. For example, a student from a rich background who has a difficult life at home, lives in a community with a high level of crime, or attends a school with little resources is unlikely to have high levels of academic performance.

While a student's family and community situation directly impacts the student's academic performance, research has shown that these negative impacts could be evened out through mindset. Susana Claro, an assistant professor of Government at the Pontificia Universidad Católica of Chile, David Paunesku, a senior behavioral scientist at Stanford University, and Carol Dweck explored the effects of mindsets on the academic performance of students affected and unaffected by poverty. Claro, Paunesku, and Dweck compared the standardized test scores, mindsets, and financial situations of students in Chile. The researchers found that at each socioeconomic level, students with a growth mindset performed better on average than those with a fixed mindset on the standardized tests (Claro, Paunesku, and Dweck, 2016). Consistently, those with a growth mindset were more likely to differentiate themselves from their peers with similar financial situations.

Mindset's Possible Relationship with Academic Risk Taking

Although growth mindset is positively correlated with academic achievement, not all mindset intervention methods currently being used have the intended effect of improving one's academic performance. Lisa Brougham, a mental health counselor at Lindenberg University in Saint Charles, Montana, along with Susan Kashubeck-West, a professor of Educational Sciences at the University of Missouri-St. Louis, studied the effects of mindset intervention on the academic performance of students with fixed mindsets. The intervention consisted of activities such as watching videos and reading. The videos and stories taught students that the brain is an incredible structure capable of learning new things and that, if students put effort into doing something, they would succeed. Although the intervention helped students adopt a growth mindset, it also negatively impacted the GPAs of the participants. The researchers explain that this unexpected result may have been caused by the short period of time which the study lasted (one year). They claim that if they had observed the participants for a longer period of time, they might have observed different results (Brougham and Kashubeck-West, 2017). Another possible explanation for this result is that the mindset intervention led to an increase in academic risk taking. The term "academic risk" refers to the risk students take when they actively pursue learning opportunities that may be challenging for them to understand. Academic risks could come in the form of a student raising their hand in class to ask a question or in the form of a student taking a course on a subject that they might find difficult to understand. In the short term, an increase in academic risk taking could lead to a negative impact on academic performance.

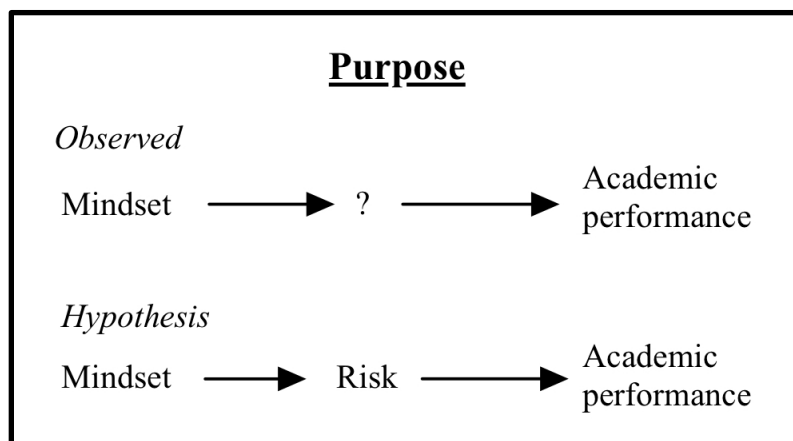
In contrast to Brougham and Kashubeck-West's research, a two-year study conducted by Greg Brigman, a professor of Counselor Education at Florida Atlantic University, and Chari Campbell, a researcher associated with Florida Atlantic University, has shown that mindset intervention is positively correlated with improvements in academic performance. The researchers found in their study "Helping Students Improve Academic Achievement and School Success Behavior" that mindset intervention, promoting a "what's in it for me [WIIFM]" (Brigman and Campbell, 2003, p. 5) rationale, improved math and reading scores of students ranging from elementary to high school. For

the intervention, students were asked to make a WIIFM statement before they began the activity that was being presented to them. This routine helped the students to invest in the activity. As students became more comfortable with using the rationale they learned to implement it outside of the interventions as well. Inside and outside of school, this rationale gives students motivation to try, but it also makes them weigh the benefits and drawbacks of situations and encourages students to take more academically related risks. Students using the WIIFM rationale are more likely to take academic risks because the benefits (knowledge and understanding of the world around them) often outweigh the drawbacks (spending more time and effort).

Although the studies done by Brougham, Kashubeck-West, Brigman, and Campbell suggest that academic risk might explain the observed correlation between mindset and academic performance, a study done by James Satterfield, the director of social and behavioral sciences at the University of California, San Francisco, and Martin Seligman, a professor of Psychology at the University of Pennsylvania, found the behavior of risk taking to be highly situational. The researchers analyzed the number of risks military generals took and the circumstances under which they took them. They found that when the war's tide was in favor of the generals, they tended to take more risks. In contrast, unfavorable circumstances led to a significant decrease in the number of risks taken. The study suggests that risk behavior changes based on circumstance and is not reflective of one's overall mindset. If what this study suggests is also true in education, then it would mean that the academic risks that a student takes are not reflective of the student's mindset. In this case, academic risk, such as raising hands or taking difficult courses, cannot be used to explain the correlation between mindset and academic achievement.

The Gap

It is well established that mindset is correlated with academic success (Claro, Paunesku, and Dweck, 2016); however, the literature does not yet explain what is causing the correlation between growth mindset and academic achievement. A study analyzing possible links between mindset and risk could help explain how mindset impacts performance. Understanding the relationship between academic risk taking and mindset might help counselors and teachers to better understand how to promote a growth mindset in a school setting. The study done by Brougham showed that mindset intervention sometimes leads to lower academic performance; however, the study done by Brigman and Campbell showed a positive correlation between mindset intervention and academic performance. Both studies point to academic risk taking as a possible explanation for the observed correlation between mindset and academic performance. In the short term, an increase in academic risk taking could explain the observed results in Brougham and Kashubeck-West's study. Additionally, Brigman and Campbell's study might have indirectly encouraged academic risk taking by promoting the WIIFM rationale; however, Satterfield and Seligman suggest that risk taking is circumstantial and unrelated to mindset. This means that academic risk taking cannot explain the correlation between mindset and academic performance. Thus, the researcher poses the question, is academic risk taking among high school students correlated with mindset?



The researcher's hypothesis is that mindset is correlated with academic risk taking alone. The researcher's hypothesis states that growth mindset will be correlated with high levels of academic risk taking and fixed mindset will be correlated with low levels of risk taking. If this is true, then it means that an increase in risk taking could

possibly lead to better academic performance. Another study would be required to confirm if risk taking truly is the bridge between academic risk taking and academic performance. If no correlation is found, then it might imply that academic risk taking is not a reason why a growth mindset is correlated with improved academic performance.

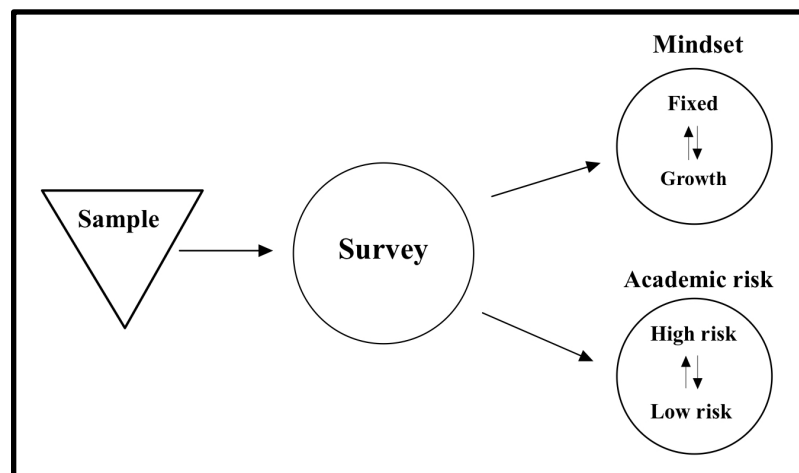
Method

Theoretical Design

To analyze the correlation between academic risk and mindset, the researcher conducted a study that uses deductive reasoning to analyze primary quantitative conceptual data. A mixed method was used to quantify a participant's mindset by using a likert scale, and assess a participant's risk taking behavior by using a set of standardized test questions. All data collected in the study are primary, as they were taken from a survey that the researcher designed. The researcher analyzed quantitative data using positivism, as the measure of participants' mindset was compared to the number of questions attempted.

Experimental Design

To test the hypothesis, a survey (Appendix B and Appendix C) was designed using a mixed method approach to quantitatively measure mindset and the academic risk behavior of a participant.



Ethical Procedure

The study conducted was approved as ethical by the Institutional Review Board (IRB) at the high school in which the study was conducted. Informed consent and voluntary participation were acquired from all participants and their parents/guardians. Additionally, each participant was anonymous in order to maintain confidentiality.

Sampling and Population

The initial research question aimed to find correlation between academic risk and mindset in education; so, the researcher decided to use high school students as the population. This population is well aligned with the research question because the academic risks that a high school student takes have a significant impact on their future. Additionally, the academic risks that they take may have a significant impact on their academic performances.

Participants at the high school were solicited using a mix of random and convenience sampling. Before data were collected, all participants were sent a questionnaire (Appendix A) following approval from the IRB. This first questionnaire was meant to confirm the willingness of the participants to continue in the study, as the study was expected to take more than ten minutes to complete. Students were likely to have to spend time outside of school in order to complete the survey. Those who answered yes to the questionnaire were sent the survey. All data were collected through random sampling. In total, the researcher was able to gather 33 willing participants.

Procedure

Following the interest questionnaire, a second survey was sent to all participants who stated that they were willing to participate. This survey was split into two parts. The first part of the survey was composed of nine questions (Appendix B). These are the same questions used by Carol Dweck and her associates in the study, “Implicit Theories and Their Role in Judgments and Reactions: A World From Two Perspectives.” These questions were designed by Dweck and her associates to determine the mindset held by the participants. Additionally, these questions were used in other studies, such as the study done by Susana Claro, David Paunesku, and Carol Dweck, “Growth Mindset Tempers the Effects of Poverty on Academic Achievement.” In this study, Claro, Paunesku, and Dweck used the questions to determine the mindset of students in Chile. Each question was based on a six-point Likert scale. The scale ranged from strongly disagree to strongly agree.

The answer “strongly agree” was assigned a value of six, while the answer “strongly disagree” was assigned a value of one. This was done so that the researcher could code the data from qualitative to quantitative. The responses for the nine questions were averaged for each individual. Participants scoring closer to six were determined to have a more fixed mindset while participants scoring closer to one were determined to have a more growth mindset.

The second part of the survey aimed to quantify academic risk while also simulating an academic environment. This part of the survey was based on two different Scholastic Aptitude Test (SAT) reading passages taken from an old version of the SAT from the late 1900s (Appendix C). The researcher chose SAT passages dating back to this period in order to avoid the possibility that a participant may have seen the passage prior to the survey while studying for the SAT. Although the original tests that the passages originated from could not be sourced, both passages passed through the same rigorous standards that the College Board, a non-profit organization that designed the test, holds for the SAT.

According to the College Board’s official website, the SAT is designed to model the content being taught in high school classrooms and measures the understanding of said content. Although the test is not peer-reviewed, the College Board invites twelve or more professional test designers to review each question that appears on the test. The College Board passes the test through a rigorous approval process that involves upwards of 100 people. The content of the test is designed so that each student should have the necessary knowledge to answer all of the questions correctly. The test is designed by the College Board to model a high school environment so that each question is fair to all students; however, there is mounting research that suggests that there may be inequity in the way the current SAT is designed. According to data collected in 2012 by the National Center for Education Statistics (NCES), the mean SAT scores of students living in lower income households are significantly lower than the scores of students living in higher income households. Although some colleges have decided to stop using the SAT as a benchmark for a student’s academic aptitude due to the mounting data that suggests that there is inequity in the current SAT, many colleges are still using the test, suggesting that these colleges still believe that the SAT is a good measure of a student’s knowledge. Each passage was accompanied by five questions regarding the content of the passage. Participants were told to answer the questions to the best of their ability. Participants were also informed of how the questions would be scored. Each question answered correctly would increase their score by one. Each question answered incorrectly would decrease the score by one. Each question that was skipped would not affect their score.

The survey was modeled after that of Seligman and Satterfield’s study. To measure risk, Seligman considered the possible gains, losses, and probability of success for each decision made by military leaders. The survey designed

by the researcher limits the possible gains and losses by weighting all of the questions the same. Each question can only impact the score by one point. The lowest possible probability of success for each question was 25% because there were only four possible answers for each question. Participants took more risk if they chose to attempt questions that they were uncertain of. The researcher then counted the number of questions attempted by each participant. The more questions that were attempted implied that the participant had taken more risks.

Results

Following the survey, some outliers in the data were removed from the data analysis. The outliers completed the survey having skipped all of the questions in the second section and completed the survey in under five minutes.

To analyze the variables for dependence, a chi-square test of independence was conducted. The researcher chose a chi-square test instead of a t-test of linear regression because the data collected were not linear. Although a t-test of linear regression tests for correlation between two variables, this test only works if the data are linear. In the case that the data are not linear, a chi-square test of independence is the more appropriate method of data analysis to test for correlation between two variables.

During the beta test, the researcher noticed that participants with more extreme growth mindsets often attempted the same number of questions as participants with more moderate growth mindsets. So, the researcher had the participants split into two categories for data analysis: those with growth mindsets, and those with fixed mindsets. To determine the category in which a participant would be placed, their responses to the first half of the survey were averaged. This average ranged from one to six. Participants with an average below 3.5 were categorized as having a growth mindset and those with an average above 3.5 were categorized as having a fixed mindset.

Questions Attempted	Growth Mindset	Fixed Mindset	Total
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	1	0	1
7	1	0	1
8	2	1	3
9	5	2	7
10	12	9	21
Total	21	12	33

Figure 1. number of participants with x mindset and answered x number of questions

To conduct a chi-square of independence test, a null hypothesis must be made. The null hypothesis states that there is no significant dependence between the two variables. In terms of the study, this would mean that mindset has no significant impact on the number of academic risks that the participants take, which in this study is defined as the risk students take when they actively pursue learning opportunities that may be challenging for them to understand. To reject the null hypothesis the calculated chi-square value must be greater than the critical value of 16.92, which was chosen based on the alpha value of 0.05 with nine degrees of freedom.

Only two participants attempted less than 8 questions. Interestingly, the participants that attempted less than 8 questions all had growth mindsets. Additionally, 31 of the 33 participants attempted more than 8 questions regardless of their mindset. The sum of the chi-squared values was lower than the critical value of 16.92, meaning that the null hypothesis could not be rejected. This was especially surprising as the researcher had not expected the difference between the sum and the critical value to be this large. As seen in Figure 2, the chi-square test of independence resulted in a p-value of 0.9951. This p-value suggests that there is little to no correlation between mindset and academic risk taking. This is consistent with the data, as the majority of participants answered most if not all of the questions regardless of their mindset. The p-value means that if the study were to be repeated, it is extremely likely that the calculated chi-squared value would deviate even more from the critical value than the deviation observed in this study.

Mindset	Questions attempted	Observed Participants	Expected	Chi Squared Value
Growth	1-5	0	0	Undefined
	6	1	0.6364	0.2077
	7	1	0.6364	0.2077
	8	2	1.9091	0.0043
	9	5	4.4545	0.0668
	10	12	13.3636	0.1391
Fixed	1-5	0	0	Undefined
	6	0	0.3636	0.3636
	7	0	0.3636	0.3636
	8	1	1.0909	0.0076
	9	2	2.5455	0.1169
	10	9	7.6364	0.2435
Sum of Chi-squared values				1.7208
P-value				0.9951

Figure 2. Chi-square of Independence Results

Discussion

New Understanding in Relation to the Gap

Claro, Paunesku and Dweck, as well as other researchers, have found a correlation between growth mindset and higher levels of academic performance. This has led to a shift in the education system as teachers and school counselors work to promote growth mindset in schools with the goal to help improve the overall academic performance of the students. Little research has aimed to explain why this correlation is being observed. What is it that students with growth mindsets are doing differently from students with fixed mindsets that is causing improved academic performances? This study aimed to identify if an increase in academic risk taking could be the link between growth mindset and improved academic performance.

When compared to the critical value (16.92), the calculated chi-squared value (1.721) is significantly smaller. The data analysis resulted in a p-value of 0.9951. This indicates that there is no significant correlation between academic risk taking and growth mindset. Since the two variables are not significantly correlated, it is unlikely that an increase in academic risk taking explains why growth mindset is correlated with improved academic performance. This result could be explained by Satterfield and Seligman's findings. Because Satterfield and Seligman found that the behavior of risk taking is largely circumstantial, it is reasonable to assume that it is also the same in an academic setting. Risk taking is not dependent on one's mindset, but rather, it could be dependent on circumstance. In an academic setting this could mean that a student with a growth mindset will decide to not take all the AP classes offered at their school, despite the possible college credit and boost in GPA that the student can gain, because they feel that taking these courses will likely overwhelm them during the school year.

New Understanding in Relation to the Research Question

The results of this study disprove the initial hypothesis made by the researcher and answer the initial research question. The initial hypothesis stated that there would be a significant correlation between the academic risks taken by the participants and mindsets of the participants. The results show that academic risk taking is not significantly correlated with one's mindset. The purpose of this study was to determine if increased risk taking could explain the correlation between one's mindset and academic performance. The p-value of 0.9951 leads to the new understanding that academic risk taking is not significantly correlated with one's mindset. This suggests that academic risk taking is not likely to explain the correlation observed between mindset and performance.

New Understanding and Implications

Based on the new understanding, risk taking cannot be used to accurately predict the mindset. This means that academic risk is likely not the reason why growth mindset is correlated with academic performance. These results suggest that other factors are causing the correlation between mindset and academic performance.

It is also important to identify the possible real-world implications this finding presents. Since this study suggests that risk taking is based on a student's circumstances rather than mindset, interventions that solely focus on encouraging academic risk taking with the goal to promote a growth mindset are not likely to be effective. Mindset interventions may be more effective if they encourage growth mindsets through other means. Further studies must be conducted in order to find more effective means that promote growth mindsets.

How does this new understanding impact education departments? In the school, this new understanding means that counselors, teachers, and administrators should not make all students take a high number of risky academic choices. The data suggest that taking a higher number of difficult courses will not necessarily help encourage a growth mindset. In the classroom, this new understanding means that making students take more risks may not always result in an improved growth mindset.

Limitations

The results can only be extrapolated to a high school located in suburban Colorado. The population is not representative of all high school students.

Additionally, some confounding factors may have impacted the results. The questions used in the study were sent out using Google Forms. Since it was sent out using the internet, the researcher could not definitively say that each participant read the instructions carefully. Usually, students are told that there is no penalty for answering questions incorrectly on a test and are encouraged to attempt all questions even if they are uncertain; however, the survey was not scored the same way. Due to the uncommon nature of how participants were told to answer the SAT questions in this survey, participants who may have missed the instructions, may have answered each question regardless of if

they were sure of the answer or not. This confounding variable could have led some participants to answer the questions without considering the consequences of answering them incorrectly. Due to this, future studies should consider surveying the participants in person. This will allow researchers to read aloud the instructions for the participants to hear, ensuring that each participant is aware of how the survey will be scored.

Lastly, the SAT questions used in the survey may not be a reliable indicator for academic risk taking. Originally, the SAT was chosen by the researcher because the test was designed to model a high school environment. However, it does not accurately model the daily interactions and risks high schoolers take each day. Although the SAT questions serve as an accurate benchmark for academic performance for high schoolers, it is not designed to accurately measure the amount of academic risk a student would be willing to take in a school setting. The structure of the SAT encourages students to take risks without regard to the consequences. Students are told at the beginning of the test that any questions answered incorrectly will not count against them. In a school setting there is significantly more weight to the risks students take. Failing a difficult class will greatly impact one's GPA which will negatively affect one's future opportunities. One way to minimize this limitation in the future is to conduct an observational study of different classrooms.

Conclusion

This study aimed to find a possible correlation between academic risk taking and mindset. The purpose of this study was to identify if academic risk taking could explain the observed correlation between mindset and academic performance present in existing literature. The new understanding found in this study is that academic risk taking is not significantly correlated with one's mindset. This suggests that academic risk taking is unlikely to explain the correlation between mindset and academic performance. Additionally, the new understanding means that mindset interventions that focus on encouraging academic risk taking are unlikely to be successful in changing students' mindset. It also suggests that teachers and educators should encourage a growth mindset through means other than academic risk taking.

As discussed in the limitations section of the paper, future researchers should consider implementing an observational study of the classroom to measure academic risk taking. During a class period, the researcher could measure academic risk by counting the number of times different students raise their hands to clarify a question. The number of questions each student asked would then be compared to the mindset of each student. This will help limit the confounding variable this study had: participants who might not have fully understood the instructions. This change will also provide the researcher with a more accurate measurement of academic risk taking. Additionally, future researchers may consider testing multiple high schools around the nation. This would not allow the researchers to extrapolate to all high schoolers in the country, but it would help researchers observe if the results of this study are consistent in different parts of the country. Finally, future researchers may want to explore other factors that might help explain the correlation between mindset and academic performance. For example, a researcher could attempt to correlate mindset with stress. A study done by Larry Hunter, the dean of Washington State University's Carson College of Business, and Sherry Thatcher, a professor of Business Administration at the University of South Carolina, found that those with a high level of commitment to a job performed better under higher levels of stress. The obligation to improve oneself could lead to increased levels of stress for those who have growth mindsets. In education this increased level of stress may lead students with growth mindsets to have higher levels of academic performance.

Although the studies done by Brougham, Brigman, Campbell, and Kashubeck-West, suggest that academic risk taking might be able to explain the correlation between growth mindset and academic performance, this study suggests that academic risk taking is not able to explain the correlation between mindset and academic performance. This study's findings are consistent with those of Satterfield and Seligman's study. Academic risk is circumstantial and is a poor indicator of the mindset of a student. Future researchers may consider doing an observational study of the classroom to better measure the risk taking behavior of high school students.

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