# Academic Stress Predicts Negative Emotions and Academic Performances: The Role of Mindset in Moderation Process

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### ABSTRACT

With different stress mindsets, people tend to take different measures when encountering stress. Due to the interference of traditional stereotypes, many individuals believe that overall pressure is still causing some negative effects on themselves. In the era of increasingly strong social pressure, high school students are especially faced with multiple academic pressures such as entering a university or maintaining a high GPA. Past studies have shown that these academic pressures will affect students' negative emotions and academic performance. Among these high-risk groups of academic stress, will the stress mindsets Chinese high school students and college students regulate the process when dealing with the impact of academic stress on students' negative emotions and academic performance? If so, what is the impact? What specific aspects are affected? Based on the above questions, this article explores the internal relationship between the stress mindset and the "academic stress affects the negative emotional academic performance of Chinese senior high school students and college students" via questionnaire. The results indicate that stress mindset moderates the process by which academic stress predicts negative emotions and that a positive mindset brings less negative emotions. Stress mindset does not necessarily moderate academic performance which is influenced by academic stress.

Keywords: Stress mindset, Academic stress, Negative emotions, Academic performances

# **1. INTRODUCTION**

## 1.1 Background Information

Stress mindset, according to Crum<sup>[4]</sup>, is the continuum of how individuals view stress or its consequences - either it is enhancing (stress-isenhancing mindset) and beneficial or it is debilitating or deleterious (stress-is-debilitating mindset). In contemporary high schools and universities, students are dealing with stress that is growing into even more severe states by each day. An increasing number of students are sharing complaints of pressure and stress, and are consequently bothered by such mental torture. Some experienced serious reduction on their academic grades, some others developed health issues which impede their school performances<sup>[14]</sup>. It is well acknowledged that students' stress mindsets have their hands in determining individuals' stress responses [19], which usually exhibit among signs of depression and anxiety-negative emotions. Therefore, this research is meant to demonstrate that the way students perceive their academic stress is ought to be claimed responsible in regulating the main effect of academic stress on students' emotions and performances.

## 1.2 Research Aim

The research aim is set in order to unveil the influences the stress mindset exert on regulating Chinese high school and university students' negative emotions and school performance influenced by academic stress. More specifically, the research focus on which stress mindset leads to a relatively outstanding emotion and academic performance result, and in what ways or to what extent does stress mindset regulate students' behaviour while dealing with academic stress.

This research will provide suggestions on how to reduce the impedance of academic stress by using appropriate strategies based on altering students' stress mindset, aiming to bring forth students' best performances and emotional well-being at school.



#### 1.3 Hypothesis

a. *Research Hypothesis 1*: Positive mindset (stress promotes personal health and overall development) reduces negative emotions under similar academic pressure.

b. *Research Hypothesis 2*: Positive mindset (stress promotes personal health and overall development)

makes students' academic performance better under similar academic pressure.

c. *Premise Study 1*: Academic pressure promotes a certain amount of negative emotions<sup>[19]</sup>.

d. *Premise Study 2*: Academic stress can promote and inhibit academic achievement (with individual differences)<sup>[14]</sup>.



Figure 1 Proposed Relationship Between the Research Objects

#### 2. METHOD

In order to determine the regulation role of stress mindset, a comparison of different mindsets' effects is needed. The process of regulation can be revealed by having a clear view of all research objects, academic stress, negative emotions, and academic stress.

The questionnaire is divided into five parts: the first part asks about the stress mindset, the second part measures the current level of academic stress, the third part evaluates the current learning status (such as academic performance, cultivation of learning habits, improvement of classroom performance, learning motivation activities, etc.), and the fourth part measures the current situation of anxiety and depression, The fifth part investigates the basic personal information (such as gender, grade, the city living in, etc.).

#### Part I: Determining Stress Mindset

This part of the questionnaire determines the positive or negative stress mindset of the individual, so as to obtain the measurement of the independent variable of the study. There are 8 questions about stress mindset, asking the subjects about their ideas and understanding of the overall impact of stress, learning, growth, performance, efficiency, health and vitality to decide the type of stress mindset of the subjects. There are two types of stress mindsets: positive stress mindset believes that stress can promote personal healthy growth and complete development (stress is enhancing); negative stress mindsets believe that stress can hinder a person's healthy growth and complete development. This part refers to the scale of stress mindset published by Crum in Personality Processes and Individual Differences in 2013<sup>[4]</sup>, which has been confirmed with high reliability and validity.

#### Part II: Academic Stress Level Measure

This part of the questionnaire has 10 questions. Academic stress is the stressor of this stress system, which can be inspected by cross analysis. The questions from part II are adapted and derived from the perceived stress scale (PSS) published in 1983<sup>[3]</sup>. In some questions, "in learning" is added to highlight the "learning" orientation. The subjects' perceived academic stress scale is measured, which has a relatively high reliability and validity.

#### Part III: Evaluating Academic Performance

there are 12 questions in part III. The 12 questions in this part are mainly investigations of GPA grades and comprehensive evaluation grades. It also asks about the overall academic progress, homework completion efficiency, classroom performance, school task response, confidence in facing learning difficulties and learning motivation vitality in order to obtain a more systematic and comprehensive academic performance. Academic stress will have a positive or negative impact on learning<sup>[14]</sup>. By measuring and comparing the learning status of subjects with different stress mindsets, we can infer the regulatory role of stress mindsets.

# Part IV: Measuring the Negative Emotion Intensity

There are 14 questions in part IV. Anxiety and depression are the most common negative emotions and the products of academic pressure<sup>[8][9]</sup>. By measuring and comparing the intensity of negative emotions of subjects with different stress orientations, we can infer the regulatory role of stress orientation. The 14 questions in this part refer to the hospital anxiety and Depression Scale (HADS) to measure the subjects' negative emotion level, which has high reliability and validity.

#### Part V: Surveying Basic Participant Information

Part V collects information of the participant, namely gender, grade and the city they live in so as to facilitate cross analysis after data collection (this is because the regulatory effect of stress mindset may have different effects in different gender, grade and city, so it can be further analysed in the same group to eliminate interfering variables)



#### A Summary of Tools and Approaches

This research uses an online questionnaire. Among them, the stress mindset measure proposed by Crum in 2013 is adopted in the first part of the questionnaire. The Chinese translation is referred to Haoyi Fu of Tsinghua University<sup>[5]</sup>. The second part of the questionnaire measures the subjects' academic stress level, which is based on Cohen, Kamark and Mermelstein's Perceived Stress Scale<sup>[3]</sup>. The author revised it by accentuating "academic", reflecting that the measurement object is "academic stress". The translation is provided by the author of this article. The fourth part of the questionnaire measures negative emotions. In this study, it mainly focuses on anxiety and depression. Therefore, HADS proposed by Zigmond and Snaith<sup>[13]</sup> in can help to effectively obtain the current anxiety and depression of participants and examine the negative emotions of students. The translation is also provided by the author of this article. This online questionnaire is made by using a website WenJuanXing and results are partially analysed by SPSSAU and IBM SPSS Statistics Version 22<sup>[15]</sup>.

## **3. POPULATION AND SAMPLING**

The target population of this study is Chinese high school students. The participants of this survey are students studying in Beijing high schools, including national high schools, international schools and international curriculum centres. A total of 111 questionnaires were collected in this survey, of which 58% were enrolled in national high schools and 42% were enrolled in international schools or international curriculum centres. Participants are from Senior 1, 2, and 3, with percentage of 14.41%, 65.57% and 17.12%, respectively. Amongst all students who took part in the survey, 44.14% were male, and 55.86% were female. The sampling technique applied is "self-selected", which is, the questionnaire is given out to schools and students participate voluntarily.

## 4. MATERIAL AND PROCEDURE

#### 4.1 Material

The complete version of the questionnaire is listed in the Appendix in the following.

### 4.1.1 Stress Mindset

A 5-point Likert scale is used. Define "strongly disagree" as the number "1", "strongly disagree" as the number "2", "neutral" as the number "3", "agree" as the number "4" and "strongly agree" as the number "5". Questions about stress as debilitating, such as question 1, 3, 5 and 7 in the questionnaire, will be scored in reverse, i.e. 6 minus the original data. Calculate the sum of the answers as a raw score. Later, calculate the average the

answers of 8 questions. If the result is greater than 3, the individual's stress mindset is SIE (stress is enhancing); If the result is equal to 3, the individual has no specific stress mindset, which is NMD (no-specific-mindset determined); If the result is less than 3, the individual's stress mindset is SID (stress is debilitating).

## 4.1.2 Academic Stress

A 5-point Likert scale is used. Define "never" as "1", "almost never" as "2", "sometimes" as "3", "often" as "4" and "very common" as "5". Questions inferred about the positive side, such as questions 4, 5, 7 and 8 of the questionnaire, will be scored in reverse, i.e. 6 minus the original data. Calculate the average the answers of 10 questions to get the academic stress level score of each individual. When the average mark of academic stress level is greater than 3, the academic stress level is high, and is defined as grade 3; When the average score of academic stress mark is equal to 3, the academic stress level is medium, which is defined as grade 2; When the average mark of academic stress level is less than 3, academic stress is low, which is defined as grade 1.

# 4.1.3 Negative Emotions: Anxiety and Depression

There are 14 questions tested both anxiety and depression. The option "most of the time" is encoded as "3"; the option "many times" is encoded as "2"; the option "occasionally or sometimes" is encoded as "1"; and the option "never" is encoded as "0". Questions about the positive side, such as question 2, 4, and 6, are scored in reverse, i.e. 3 minus the original data. Each participant presents an anxiety score and a depression score. The two scores are then averaged to obtain the negative emotion evaluation of the participant.

#### 4.1.4 Academic Performances

The 5-point Likert scale of 10 scoring options in the questionnaire is defined as 5 to 1 from excellent to poor, except class participation and citizenship is from 3 to 1. Academic performance is assessed from five different perspectives: learning motivation, courage to overcome academic difficulties, academic growth, classroom participation and citizenship, schoolwork coping. Questions involving the same perspective is averaged to acquire the score for that particular perspective. Question 4 and 5 surveys the current GPA. Question 6 is related to academic growth. Question 7 is related to the courage to overcome difficulties during learning (courage to overcome academic difficulties). Question 8 is related to the speed of finishing homework compared to peers of the same class (schoolwork coping). Question 9 is related to the dealing of schoolwork and school-based activities (schoolwork coping). Question 10 is related to how thorough they follow each class (classroom participation

5.1.2 Academic Stress

and citizenship). Question 11 is related to how they performed in their weak subjects (academic growth). Question 12 is related to students' learning motivation (learning motivation).

## 4.2 Procedure

The online questionnaire is sent to students by social media WeChat. Students are required to fill in the questions provided in the questionnaire supported by WenJuanXing, an online survey generator. In the end, a total of 111 high school students were recruited.

#### 5. ANALYSIS AND RESULT

### 5.1 Descriptive Statistics

#### 5.1.1 Stress Mindset

According to the statistics, about 50.4% students (N =56) have SIE mindset and consider stress as a positive being. About 33.3% students (N=37) have SID mindset and consider stress as a negative being. Approximately 16.2% students (N=18) don't have a specific mindset because they think that role of stress had no obvious distinction between promotion and inhibition. It can be seen that the general trend indicates that students show a positive mindset towards stress and maintain a good attitude in the face of pressure. However, a considerable number of students still consider pressure as negative and resists stress. In addition, a small number remains neutral.

There are also gender differences. Among all students who hold SIE mindset, about 58.9% (N=33) are females and 41.1% are males (N=23). Under SIE, females are the domination. Among NMD students, 44.4% are females (N=8) and 55.6% are males (N=10). Under NMD, there are more males than females. Among all SID students, 56.8% are females (N=21) and 43.2% (N=16) are males. Out of all male participants, SIE 51.0%, NMD 20.4%, and SID 28.6%. Out of all female participants, SIE 56.5%, NMD 12.9%, and SID 30.6%. Thus, it can be concluded that, as a whole, women are more likely to have clear mindset aspirations, while men tend to be rather neutral.



**Figure 2** Academic Stress Levels (SD=standard error) (SIE=Stress-is-enhancing; SID=Stress-is-debilitating)

The survey results show that in group SID, up to 59.5% (N=22, SD=standard error) of the students have high level of academic pressure, 35.1% (N=13) have a low level of academic pressure, and 5.4% (N=2, SD=standard error) have an average level of academic pressure. The most prominent group is the high academic pressure group. In the group with stress mindset of SIE, up to 69.6% (N=39, SD=standard error) of students have low academic stress, 17.9% (N=10, SD=standard error) have high academic stress and 12.5% (N=7, SD=standard error) have average academic stress. The difference between SID and SIE is most prominent in the low academic pressure group. Although it is impossible to directly judge the relationship between existing academic pressure and stress mindset in this survey, it can be inferred that since the academic pressure level of SID is significantly higher than that of SIE group, students with higher academic pressure may be more likely to hold SID stress mindset, or students with SID mindset are more likely to have greater academic pressure, but this needs further proof.

# 5.1.3 Negative Emotions: Anxiety and Depression

SIDs and SIEs were compared (see figure 3). Under the same academic pressure level, the negative emotion scores of SIDs were generally higher than those of SIE group. In the low academic stress group, the mean negative emotion of subjects with SID mindset was 9.92 points (SD = 2.1), and the mean negative emotion of subjects with SIE mindset was 10.23 points (SD = 1.8); The mean value of negative emotion of subjects with SID and SIE mindsets were 11.66 (SD = 0.4) and 9.07 (SD= 1.8) respectively. In the high academic stress group, the mean negative emotion score of subjects with SID mindset was 9.92 (SD = 2.1), and the mean negative emotion score of subjects with SIE was 10.23 points (standard deviation = 1.8). This shows that under the same level of academic stress, the negative emotional status of SID group is generally worse than that of SIE group. On the contrary, the negative emotions of SIE were less exhibited. More specifically, the negative stress emotion score of participants with SIE mindset was on average 1.08 points lower than participants whose mindsets are SID. It can be seen that SIE stress mindset can to some extent reduce the generation of negative emotions.





#### 5.1.4 Academic Performances

The results showed that the overall score of SIE group was significantly higher than that of SIE group (See figure 5). In terms of learning motivation, SIE had an average score of 3.7/5 (SD=0.8) while SID had an average score of 3.1/5 (SD=1.0). In terms of courage to overcome academic difficulties, SIE had an average score of 3.7/5 (SD=0.9) while SID had an average of 3.6/5 (SD=1.0). In terms of academic growth over the past academic term, SIE had an average score of 3.8/5 (SD=0.9) while SID had only an average score of 3.2/5 (SD=1.0). In terms of class participation, SIE scored an average of 2.3/3 (SD=0.6) while SID had an average score of 2.0/3 (SD=0.6). In terms of coping with schoolwork and homework, SIE had an average of 3.6/5 (SD=0.8) while SID only aimed a 3.0/5 (SD=0.8). It can be seen that the students of SIE are generally more serious and can maintain focused in class; they take down more detailed notes and are more active thinkers in class. Students in SIE group generally have higher efficiency in completing homework, and can easily deal with various tasks assigned by school or other activities. At the same time, students in SIE group have a stronger learning motivation and more firm confidence in facing academic difficulties in terms of learning. On a descriptive level of analysis, it shows that compared with SID, students in SIE group are more outstanding in academic performance.

**Compared Academic Performances** 



**Figure 4** Compared Academic Performance (SIE=Stress-is-enhancing; SID=Stress-is-debilitating)

#### 5.2 Correlation Analysis

As to determine the relationship between the variables involved in this study, a bivariate correlation test was conducted. A significant positive correlation is found between negative emotions and academic stress (r=0.643, p<0.01) (seen in Figure 5).



Figure 5 Negative Emotions Lead by Academic Stress

As academic stress level increases, the intensity of negative emotions increase as well. Besides, academic performance is confirmed to be negatively associated with academic stress (r=-0.491, p<0.01) (Seen in Figure 6).



Figure 6 Academic Performance Lead by Academic Stress

Pearson Correlation Test											
	Mean	Standard Deviation	1	2	3	4					
1. Mindset Score	25.234	4.515	1								
2. Academic Stress	29.018	5.274	-0.432**	1							
3. Negative Emotions	16.387	5.174	-0.425**	0.643**	1						
4. Academic Performance	18.239	3.312	0.391**	-0.491**	-0.444**	1					
* p<0.05 ** p<0.01											

The higher the academic stress, the poorer the academic performance. In a word, this laid the basic

foundation for further investigation in regression modelling.

The table above (Figure 7) is an overview of the descriptive data and bivariate correlations. The average mindset score was 25.234 (SD=4.515), ranging from to. 14 to 40. The average academic stress score is 29.018 (SD=5.274), ranging from 16 to 46. The average negative emotion score is 16.387 (SD=5.174), ranging from 4 to 30. The average academic performance score is 18.239 (SD=3.312), ranging from 9 to 25.

As demonstrated in the table, out of all correlations, negative emotions and academic stress had the strongest relation (r=0.643, p<0.01). Comparing to academic performance and academic strength, negative emotions had a much larger number for r's absolute value. Other correlations are also significant but not as influential, with an approximate r absolute value of 0.4. All relationships are highly reliable, since all p values are less than 0.01.

# 5.3 Moderator Effects

A series of linear regression test were carried out. Detailed results are exhibited in the table.

## 5.3.1 Negative Emotions

Model 1 is consisted of the independent variable, in this case, academic stress. Model 2 added the moderator variable mindset score. Model 3 inserted interactive item, which is calculated by the multiplication of the independent variable academic stress and the moderator variable stress mindset score. Although displayed in former explanations and analysis, stress mindset is divided into three groups, namely SIE (stress-isenhancing), NMD (no-mindset-determined), and SID (stress-is-debilitating); an alternative score was used during regression analysis. The raw score for each participant's stress mindset was extracted and utilized as "Mindset score" because regression analysis requires continual data.

Moderator effect may be observed through two ways. One of which is to acquire the results by calculating the significance of interactive items, and is used in this research.

Model 1 is designed to examine the effect of independent variable (academic stress) exerted on the dependent variable (negative emotions) without concerning the moderator (stress mindset score). Interpretation can be made from the table, showing that the independent variable (mindset score) is highly significant (t=0.875, p<0.05). This means that Academic stress has a salient relationship with negative emotions. This was further supported by correlation analysis mentioned in priory.

Read from the table (Figure 8), academic stress and mindset score's interactive item demonstrate more significance (t=-2.206, p=0.03 < 0.05). This equates to that as academic stress leads to negative emotions. And, if the moderator stress mindset is different, the generated negative emotions will be largely impacted and thus differed. Hence, a firm claim can be established: stress mindset can regulate the process in which academic stress provokes negative emotions. Research hypothesis 1 can be retained.

Stress Mindset's Moderating Effects on Negative Emotions and Academic Stress (n = 111)																			
	Model 1					Model 2					Model 3								
	В	standard error	t	р	β	В	standard error	t	р	β	В	standard error	t	р	β				
constant	16.387	0.378	43.362	0.000**	-	16.387	0.371	44.189	0.000**	-	16.094	0.388	41.495	0.000**	-				
Academic Stress	0.63	0.072	8.759	0.000**	0.643	0.553	0.078	7.068	0.000**	0.564	0.563	0.077	7.307	0.000**	0.574				
Mindset Score						-0.208	0.091	-2.279	0.025*	-0.182	-0.229	0.09	-2.537	0.013*	-0.2				
Academic Stress*Mindset Score											-0.029	0.013	-2.206	0.030*	-0.158				
R <sup>2</sup>	0.413					0.44					0.464								
Adjust R <sup>2</sup> _	0.408					0.43					0.449								
F value	F (1,109)=76.723, p =0.000					F (2,108)=42.435, p =0.000					F (3,107)=30.925, p =0.000								
$\triangle R^2$	0.413					0.027					0.024								
$\triangle$ F value	F (1,109)=76.723, p =0.000					F (1,108)=5.194, p =0.025					F (1,107)=4.866, p =0.030								
Dependent variable: Negative Emotions																			
					*	n < 0.05	** n < 0.01	* - <0.05 ** - <0.01											

Figure 8 Stress Mindset's Moderating Effects on Negative Emotions and Academic Stress



## 5.3.2 Academic Performances

A similar process like 8.3.1 can be performed to assess the moderator effect on academic performances. Results are shown in the table below (Figure 9).

Stress Mindset's Moderating Effects on Academic Performances and Academic Stress (n = 111)															
	Model 1					Model 2					Model 3				
	B	standard error	t	р	β	В	standard error	t	р	β	В	standard error	t	р	β□
constant	18.239	0.275	66.308	0.000**	-	18.239	0.269	67.791	0.000**	-	18.365	0.285	64.332	0.000**	-
Acadmic Stress	-0.309	0.052	-5.892	0.000**	-0.491	-0.249	0.057	-4.382	0.000**	-0.396	-0.253	0.057	-4.462	0.000**	-0.403
Mindset Score						0.162	0.066	2.436	0.017*	0.22	0.171	0.067	2.565	0.012*	0.233
Acadmic Stress*Mindset Score											0.012	0.01	1.295	0.198	0.107
R 2_	0.242					0.281					0.292				
Adjust R 2_	0.235					0.268					0.272				
F value_	F (1,109)=34.712,p=0.000					F (2,108)=21.107,p=0.000					F (3,107)=14.719,p=0.000				
△R <sup>2</sup> _	0.242					0.039					0.011				
$\triangle F$ value_	F (1,109)=34.712,p=0.000					F (1,108)=5.932,p=0.017					F (1,107)=1.677,p=0.198				
Dependet variable: Academic Performance															
* p<0.05 ** p<0.01															

Figure 9 Stress Mindset's Moderating Effects on Academic Performances and Academic Stress

However, the interactive item for academic performances is not significant enough (t=1.295, p=0.198>0.05). The change in  $R^2 = 0.011$ , which is extremely close to zero. This implies that as stress mindset changes, academic performance will differ little. Hence, there is no regulation role for stress mindset via the process by which academic stress influences academic performance. Therefore, hypothesis 2 should be rejected and an alternative null hypothesis should be replaced.

# 6. CONCLUSION

To conclude, stress mindset can moderate the process which academic stress leads to negative emotions. A more positive mindset smoothens the procedure and can result in less amount of negative emotions. A negative mindset can promote larger amount of negative emotions lead by academic stress. On the other hand, stress mindset cannot, to a significant extent, moderate the process in which academic stress leads to poorer academic performance although there is certain descriptive evidence that negative mindset correlates with poorer performance.

The present research explored the moderating effect of stress mindset between academic stress and negative emotions along with academic performances. Processed data suggests that stress mindset regulates the influence of academic stress on negative emotions as inferred from the high significance of interactive item of stress mindset's score and academic stress. Nevertheless, academic performances cannot be essentially regulated by stress mindset because the significance of interactive item for academic performances is not substantial. However, when compared between SIE and SID, SIE has a better reflection on academic performances. This might indicate that stress mindset can also be a factor of academic performance's manipulators. A further correlation test was piloted, as results illustrates a clear and significant relation between academic performance and stress mindset (r=0.391, p<0.01). There may be several explanations to why stress mindset is not presented to be a significant moderator of academic

stress in this study. First, academic performance is a result of a complex system so that it may be difficult to specify the moderating effect of one variable such as stress mindset. Otherwise, it may be that the moderating effect of stress mindset may seem too weak compared to known major moderators of academic other performances. For instance, in relevance to social cognitive learning theory, precedent studies revealed that academic self-concept contributes to higher grades in school tests<sup>[2]</sup>. Breakfast habits and nutritional status are influential factors of how well adolescents memorize new knowledge learned in school and the application of information in tests<sup>[11]</sup>. Additionally, students' contextual factors such as discipline and prior education play a crucial role in determining their studying patterns<sup>[16]</sup>, which may further result in differences among academic performances, not to mention the birthgiven individual differences in intelligence and academic potential. That is to say, students with SID mindset may have lower academic self-concept, or had unhealthy foods that provided poor nutrition so that the working memory may be impeded. Therefore, they pay less focused attention in class and could lead to lower efficiency when studying. Thus, a worse academic performance. Nevertheless, though a majority of students reported a positive stress mindset in the online survey, their actual response of stress when encountering academic stress in reality may vary since there could be participant bias in a questionnaire.

This current study is constructed to give insight to the power of stress mindset. Stress mindset is found to be a momentous regulator of the generation of negative emotions by academic stress. In education systems, insufficient notion is drawn to high school student's academic stress. Little is shared with students on how to ease and release academic stress scientifically and healthily. For fields of applications, this research proposes that high schools and parents in future, especially ones in China, should help their students shape a positive mindset so that students would face fewer negative emotions in their academic daily life.

In this current study, academic performance is shown to have negative correlation with academic stress.



Regardless, stress mindset does not pose a significant moderating effect. Therefore, further investigations and studies could be built upon finding the detailed relationship between academic performance and stress mindset.

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