

Research on the Correlation between Academic Emotion and Grit among Chinese College Students

Yingxin Li^{1,a}, Xiaoru Lin^{2,b,*}

¹School of Foreign Studies, Hebei Normal University, Shijiazhuang, China

²School of Foreign Studies, Hebei Normal University, Shijiazhuang, China

^ayxlicui@163.com, ^b17836580552@163.com

*Corresponding author

Abstract: The relationship between emotions and grit has been investigated in various backgrounds. However, the specific correlations between academic emotion and grit, as well as how the sub-dimensions of academic emotion and grit interact with each other, still require deep attention, particularly within the group of Chinese college students. Therefore, this study aims to explore these relationships by inviting 138 Chinese college students to participate in an offline questionnaire survey voluntarily. The data is analyzed using SPSS 26.0, including descriptive statistics and correlation analysis. The main findings are as follows: (1) College students' academic emotion and grit are both at medium levels. (2) Academic emotion is positively correlated with students' grit. As for correlations between academic emotion, grit, and their sub-dimensions, academic emotion correlates with "consistency of interest" positively. Grit correlates with positive high-arousal and low-arousal emotions positively. "Perseverance of effort" correlates with positive emotions and negative low-arousal emotions. "Consistency of interest" correlates with negative emotions and positive low-arousal emotions. "Adaptability to situations" correlates with positive emotions and negative low-arousal emotions. The results indicate that students' academic emotions and grit interact with each other to some extent. Based on the findings, the pedagogical implications and suggestions for future research are discussed.

Keywords: Academic Emotion, Grit, College Students, Correlations

1. Introduction

With the continuous advancement of the Chinese higher education system, an increasing number of students are entering college campuses. As a major group of higher education, college students are not only required to have a solid foundation in professional knowledge but also need to possess positive academic emotions and strong personalities to cope with various challenges in their learning process. At present, enjoyment, anxiety, and boredom have been confirmed their important impacts on students' academic performance^[1]. Besides, grit, as a positive construct, has been verified to have a positive influence on students' performance^[2-3]. However, how grit interacts with sub-dimensions of academic emotion has not been fully explored. Therefore, it is significant to figure out the correlations between academic emotion and grit, particularly in college students. The current study not only aims to explore the correlation between Chinese college students' academic emotion and grit but also tries to figure out the correlations among sub-dimensions of academic emotion and grit. We also hope to expand research in educational psychology and offer practical guidance for teachers to support college students facing challenges during their learning process.

2. Literature Review

2.1. Definitions of Academic Emotion and Grit

Academic emotion is defined as the emotions experienced by students in their learning and teaching situations, which was initially introduced in the field of psychology in the 21st century^[4]. However, the research on academic emotion was in a scattered state, especially the insufficiency of integrated theory. To analyze academic emotion systematically, Pekrun^[5] proposed the control-value theory, which suggests that academic emotion should be defined through the dimensions of valence and activation. In terms of valence, academic emotion can be divided into positive emotions and negative emotions. In the

dimension of activation, academic emotion can be divided into high-arousal and low-arousal emotions. This division enhances the feasibility of studying students' emotional experiences.

Grit is conceptualized as a higher-order construct that consists of two lower-order dimensions: "perseverance of effort" and "consistency of interest"^[6]. "Perseverance of effort" refers to the ability to persist in applying continuous effort towards achieving a goal, despite facing challenges, setbacks, or obstacles along the way. "Consistency of interests" refers to the stability of a person's interests or passions over time. It describes how someone's interests remain relatively unchanged throughout different stages of their life. To adapt to a collectivist setting, quantitative research was conducted and the third dimension of grit was further identified as "adaptability to the situations", which refers to an individual's capacity to effectively adjust to changing circumstances and situations in life^[7]. As a result, the expansion of grit from two dimensions to three dimensions provides a new measurement for us to understand the role of grit in a collectivist society.

2.2. Related Research about the Correlation Between Grit and Academic Emotion

Current research has demonstrated the correlation between grit and academic emotion^[8]. Some researchers tend to investigate this correlation from the perspective of students. Zhao and Wang^[9] found that grit plays a crucial role in the academic emotion of Chinese EFL learners and ethnic minority students, as it is significantly correlated with positive emotions such as enjoyment and negative emotions like boredom and anxiety. These findings emphasize the importance of nurturing grit in education settings, particularly for college students. Additionally, there are also a few researchers who testified the relationship between grit and academic emotion from the perspective of a teacher^[10]. The authors have found that grit plays a mediating role between students' several sub-dimensions of academic emotion and teacher support or teacher caring.

Overall, it can be concluded that the direct and indirect relationship mentioned above consistently supports that grit and academic emotion are correlated with each other to some extent. However, the interaction of sub-dimensions between academic emotion and grit has not been thoroughly examined. Therefore, it becomes crucial for the current investigation to delve deeper into the intricate correlations of sub-dimensions between grit and academic emotion, to help educators incorporate effective strategies into their teaching practices and assist students in developing the necessary skills and positive mindset to overcome challenges in their learning process.

3. The Present Study

The present study aims to bridge the research gaps by investigating the various correlations between academic emotion and grit among Chinese college students. Drawing upon theoretical foundation and prior empirical research, the following three questions will be discussed: (1) What are the general profiles of academic emotion and grit among college students in their learning process? (2) Does a significant correlation exist between college students' academic emotion and their grit? If so, what are the correlations between academic emotion, grit, and their sub-dimensions?

4. Methods

4.1. Participant

Convenience sampling was adopted in the study. A total of 140 students from a provincial key university in Hebei Province were selected as the participants. All the participants have experienced a complete nine-year compulsory education and senior high school education in China. Finally, 138 valid questionnaires were collected. Among them, there were 48 male students and 90 female students. The participants included 59 students from the major of geography science and 79 students from the major of computer science and technology.

4.2. Instrument

The questionnaire was adapted from three previous research instruments^[7, 11-12]. It consists of 55 items measured on a 5-point Likert scale, ranging from "1 (completely inconsistent with me)" to "5 (completely consistent with me)". The first 39 items were designed to assess students' academic emotion, covering four dimensions of academic emotion: positive high-arousal, positive low-arousal, negative high-arousal,

and negative low-arousal. The remaining 16 items were designed to measure students' grit, covering three dimensions of grit: perseverance of effort, consistency of interest, and ability to situations. The Cronbach's alpha of the adapted questionnaire was 0.753. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy is 0.714. Bartlett's test of sphericity is significant ($p < .05$).

4.3. Procedure and Data Analysis

Before the investigation, we obtained consent from the students' headmasters and teachers. We also took the opportunity to inform the students about the specific research objectives. Questionnaires in paper-and-pen format were administered in classrooms with the following considerations: First, we implemented rigorous measures to guarantee the confidential treatment of their responses, honoring their trust and maintaining the privacy of their personal information. Second, all the students demonstrated their willingness to participate in this study actively. After completing the questionnaire, the researchers collected questionnaires and eliminated invalid responses, resulting in 138 valid questionnaires. The data from these questionnaires was analyzed using SPSS 26.0. Descriptive statistics and Pearson's correlation analysis were employed to investigate the relationships between academic emotion and grit, as well as how their sub-dimensions interact with each other.

5. Results

5.1. The General Profiles of College Students' Academic Emotion and Grit

To assess the general profiles of college students' academic emotion and grit, descriptive statistical analysis was conducted on the total scores of academic emotion and grit as well as the scores of each dimension. The results are presented in Table 1.

Table 1: General profiles of college students' academic emotion and grit

	M	SD
Academic emotion	3.29	.091
positive high-arousal	4.01	.232
positive low-arousal	3.05	.267
negative high-arousal	3.42	.396
negative low-arousal	2.83	.371
Grit	3.41	.139
Perseverance of effort	3.25	.345
Consistency of interest	3.20	.441
Adaptability to situations	3.97	.351

On the one hand, according to Table 1, the academic emotions of college students are generally moderate with small individual differences ($M=3.29$, $SD=.091$). Specifically, students' positive high-arousal emotions appear at high levels ($M=4.01$), while positive low-arousal emotions ($M=3.05$), negative high-arousal emotions ($M=3.42$), and negative low-arousal emotions ($M=2.83$) are all at moderate levels. On the other hand, the level of grit among college students is also moderate ($M=3.41$), with the dimensions of "perseverance of effort" and "consistency of interest" both falling within the moderate range ($M=3.25$, 3.20), while "adaptability to situations" is reported as a high level ($M=3.97$). In conclusion, both the academic emotions and grit of college students are at moderate levels. However, students tend to experience more positive academic emotions compared to negative ones. Additionally, among the three sub-dimensions of grit, students display the highest level of "adaptability to situations".

5.2. Correlations Analysis between College Students' Academic Emotion and Grit

To explore the intricate correlations between academic emotion and grit deeply, this study also conducted a Pearson correlation analysis between academic emotion, grit, and their sub-dimensions respectively. The results are presented in Table 2.

Based on the results of correlation analysis, a significantly positive correlation can be found between academic emotion and grit among college students ($r = .272$, $p < .01$). When students experience higher academic emotion, the level of grit also tends to increase. Conversely, the level of grit decreases when students experience a lower level of academic emotion.

Table 2: Correlation analysis between college students' academic emotion and grit

	AE	PAE	PDE	NAE	NDE	Grit	POE	COI	ATS
AE	1								
PA	.502**	1							
PL	.117	.420**	1						
NA	.799**	.195*	-.263**	1					
NL	.623**	-.202**	-.493**	.566**	1				
Grit	.272**	.367**	.315**	.099	-.056	1			
POE	.133	.330**	.541**	-.038	-.296**	.620**	1		
COI	.268**	.069	-.167*	.230**	.320**	.560**	-.199*	1	
ATS	.037	.316**	.271**	-.081	-.238**	.653**	.408**	.023	1

(* indicates $p < .05$. ** indicates $p < .01$. AE represents academic emotion, while PA, PL, NA, and NL represent positive high-arousal, positive low-arousal, negative high-arousal, and negative low-arousal emotions respectively. POE, COI, and ATS represent the three dimensions of grit respectively: perseverance of effort, consistency of interest, and adaptability to situations)

Firstly, in terms of the relationship between academic emotion and sub-dimensions of grit, it can be concluded that there is a significantly positive correlation between academic emotion and a sub-dimension of grit-“consistency of interest” ($r=.268$, $p < .01$). This means that a higher level of academic emotion is associated with a greater ability for students to pursue their interests consistently. However, the results also indicate that there is no significant correlation between academic emotion and the other two dimensions of grit, “perseverance of effort” and “adaptability to situations” ($p > .05$).

Secondly, when examining the relationship between grit and sub-dimensions of academic emotion, we conclude that there is a significantly positive correlation between grit and positive high-arousal emotions ($r=.367$, $p < .01$), as well as between grit and positive low-arousal emotions ($r=.315$, $p < .01$). However, there is no significant correlation between grit and negative academic emotions ($p > .05$).

Additionally, there are varying levels of correlation between the sub-dimensions of academic emotion and grit. Firstly, “perseverance of effort” shows a significantly positive correlation with positive high-arousal ($r=.330$, $p < .01$) and positive low-arousal emotions ($r=.541$, $p < .01$). It also displays a significantly negative correlation with negative low-arousal emotions ($r=-.296$, $p < .01$). However, the correlation between “perseverance of effort” and negative high-arousal emotions is not significant ($p > .05$). Secondly, “consistency of interest” exhibits a significantly positive correlation with negative high-arousal ($r=.230$, $p < .01$) and negative low-arousal emotions ($r=.320$, $p < .01$). It also demonstrates a significantly negative correlation with positive low-arousal emotions ($r=-.167$, $p < .05$). Lastly, “adaptability to situations” is significantly positively correlated with positive high-arousal ($r=.316$, $p < .01$) and positive low-arousal emotions ($r=.271$, $p < .01$). There is also a significant negative correlation between “adaptability to situations” and negative low-arousal emotions ($p < .01$).

6. Discussion

6.1. Discussion on the General Profiles of Academic Emotion and Grit

Based on the results of descriptive statistics, it is found that Chinese college students generally experience moderate levels of academic emotion, with a higher prevalence of positive emotions compared to negative ones. This finding is consistent with a previous study by Li and Han^[13], which suggests that Chinese college students possess strong adaptability and effective emotional regulation strategies when faced with academic pressures. Furthermore, Chinese college students exhibit the highest levels of positive high-arousal emotions, indicating the ability to handle difficulties in their academic journey with composure. This positive physiological state can also stimulate students' behavior, ultimately leading to improved academic performance.

The level of grit among college students is moderate, with the highest level being “adaptability to situation”. This finding contradicts the previous study by Datu et al^[7], which reported the highest level of “perseverance of effort”. College students often face unfamiliar learning environments, which have an impact on their mental health. The complex interpersonal relationships, diverse courses, and classroom activities can make many students feel uncomfortable. However, the competitive environment leads them to adapt to these changes quickly. In comparison to other cultural backgrounds, the Chinese education system emphasizes the cultivation of students' comprehensive qualities, especially their learning methods, and problem-solving skills^[14]. With the implementation of mental health education for

college students, this cultivation can help Chinese students develop stronger adaptability. It also teaches them to face challenges with courage and lay a solid foundation for their future career development.

Concerning the moderate levels of “perseverance of effort” and “consistency of interest”, there are several reasons that could be considered. Firstly, when students engage in learning activities with long-term dedication, their level of perseverance increases. This is important for college students in the competitive higher education environment of China, as their ability to persist in learning is directly related to the realization of the Chinese Dream. Therefore, the higher education system must pay attention to improving students’ grit. Secondly, the moderate level of “consistency of interest” can be attributed to several factors. College year is a critical period for students to explore their interests. However, the diverse academic demands can present a challenge for students to maintain consistent interests. Additionally, external pressures such as competition for employment can also influence students’ consistency of interests. Therefore, it is essential to help students find a balance between their interests and their development by encouraging them to participate in extracurricular activities and cultivating their persistent interests. Furthermore, Chinese college students often face a lack of teaching resources in their schools^[14], which can also hinder the development of the pursuit of their interests. To maintain students’ consistency of interests, teachers should pay attention to the challenges students face in the learning process, especially with limited resources.

6.2. Discussion on the Correlations Between Academic Emotion and Grit

6.2.1. Academic Emotion and Grit

There is a significantly positive correlation between academic emotion and grit among college students. This finding is consistent with previous research^[4]. The complex interpersonal relationships, the diversity of courses, and the classroom activities mentioned above give rise to the expression of different academic emotions. According to the broaden-and-build theory^[15], negative emotions limit the attention span and also hinder the accumulation of individual resources. Individuals who suffer from negative emotions for a long time may withstand academic pressure to a great extent. Under this condition, Chinese college students’ personal development is limited as well. However, positive emotions can alleviate the negative effects of negative emotions. Therefore, the correlation between academic emotion and grit is undeniable. Further research is warranted to delve deeper into the relationship between specific emotions and grit, which can provide valuable insights for educators to implement specific and effective psychological counseling methods for college students.

6.2.2. Academic Emotion and Sub-dimensions of Grit

There is a significantly positive correlation between academic emotion and one dimension of grit, which is known as “consistency of interest.” According to a previous study, positive academic emotions can enhance individuals’ interest in learning, which in turn acts as a driving force for their motivation^[16]. When students experience positive emotions in the learning process, such as enjoyment or pride, their academic achievements tend to be better. Therefore, they are more likely to develop a sustained engagement in their academic pursuits. Besides, positive emotions can also foster a collaborative learning environment^[17], in which students are more likely to participate actively in discussions and develop their interests. In contrast, when college students experience negative academic emotions, they may begin to doubt their abilities. This kind of self-doubt will also affect students’ sustained interest in learning. Future research should figure out the interaction among college students’ emotions, personalities, and motivations through longitudinal studies. It can provide practical support for college education.

While the correlations between academic emotion and the other two dimensions of grit, “perseverance of effort” and “adaptability to situations”, are not significant. That is to say, when college students’ academic emotion is regarded as a whole, the interaction between emotion and two sub-dimensions of grit is not obvious. “Perseverance of effort” and “adaptability to situations” can be seen as individual factors that play important roles in shaping students’ personalities. However, the arousal of academic emotion is related to many factors, which can be mainly divided into individual factors and external factors. The current study only focuses on individual factors and neglects the influence of external factors on college students’ academic emotion, such as teacher support and parenting style. It can be seen as the result of the insignificant correlation mentioned above. Future research could study the chain mediation among students’ emotions, personalities, teacher support, and parenting style based on the ecosystem theory.

6.2.3. Grit and Sub-dimensions of Academic Emotion

There is a significantly positive correlation between students' grit and one dimension of academic emotion, which is known as positive academic emotions. Experiencing positive academic emotions can cultivate an active learning environment^[15], fostering students' engagement and motivation. Hence, college students with higher grit approach their academic goals with a more positive attitude, enabling them to engage in their studies with a happier mindset. Furthermore, exceptional grit empowers college students to confront the challenges and setbacks encountered during the learning process actively and positively, leading to a greater manifestation of positive emotions. For instance, successfully overcoming difficulties or dealing with setbacks allows them to experience a strong sense of pride. As a result, students may exhibit higher levels of grit, leading to enhanced achievement. In contrast, there is no significant correlation between grit and negative academic emotions. It suggests that a higher level of grit may not necessarily affect students' experiences of negative emotions. These findings are in line with previous research^[7]. It further supports that college students in the present study may have a clearer understanding of their values and the significance of academic goals at the level of consciousness. To achieve their academic goals, they focus on tasks and respond to setbacks actively. Therefore, they tend to maintain a positive academic mindset instead of a negative one.

However, there is an insignificant correlation between grit and negative academic emotions. College students begin to learn more deep and professional learning content, which involves more abstract concepts and theories and will be more difficult than those in high school. They may know more about how to deal with academic stress than high school students. Therefore, the negative influence of negative academic emotions on college students' grit is not obvious in this study.

6.2.4. Sub-dimensions of Academic Emotion and Sub-dimensions of Grit

To begin with, positive high-arousal and low-arousal emotions are correlated with "perseverance of effort" positively. This indicates that college students who possess the trait of "perseverance of effort" are more likely to experience positive academic emotions. Positive high-arousal emotions, such as enjoyment and hope, are associated with heightened motivation and willingness to overcome academic challenges. On the other hand, positive low-arousal emotions, provide individuals with a sense of calmness and tranquility. Therefore, these positive mindsets help sustain students' pursuit of academic excellence^[18]. However, college students' "perseverance of effort" also shows a significantly negative correlation with negative low-arousal emotions. These negative emotions may cause students to doubt the certainty of their academic results and lead to procrastination. As a result, students may struggle to achieve their academic goals.

Negative high-arousal and low-arousal emotions are correlated with students' "consistency of interest" positively. This suggests that students who maintain a consistent interest in a specific domain are more likely to experience negative academic emotions when faced with difficulties in their studies^[19]. However, Chinese college students tend to have a moderate level of grit, and the fixed core curriculum in college may not align with individual interests. Additionally, traditional teaching methods often prioritize imparting knowledge over cultivating students' interests and practical abilities. As a result, when students perceive the learning content as irrelevant to their interests, they are more likely to experience negative arousal emotions. It is worth noting that the consistency of interest also shows a significantly negative correlation with positive low-arousal emotions. Chinese college students face immense pressure from fierce employment competition and societal expectations^[14]. To cope with this pressure, some students may choose to pursue majors that align with both the current job market and their interests, making it easier for them to find suitable jobs after graduation. However, this can also create a challenge in balancing their interests with the demands of the job market, leading to difficulty in experiencing positive low-arousal emotions during their learning process.

Furthermore, two sub-dimensions of positive academic emotions correlate with "adaptability to situations" positively. It supports the evidence that if students were able to adapt to environmental changes easily, they were more likely to experience positive emotions, such as enjoyment. This correlation can be explained by the broaden-and-build theory, which suggests that positive emotional experience can expand the individual's attention^[15], cognition, and behavioral model, and then enhance the individual's environmental adaptability. A significantly negative correlation between "adaptability to situations" and negative low-arousal emotions also needs to be noticed. Individuals who possess high environmental adaptability may adjust their behavior and mindset by emotional regulation strategies. This may enhance the individual's emotional arousal level and help them cope with stress easily. To help college students alleviate negative emotions, future research should dig into students' use of emotion regulation strategies in various environments through comparative studies.

Interestingly, three correlations may seem insignificant at first glance, but are worth paying attention to: the correlation between “perseverance of effort” and negative high-arousal emotions, the correlation between “consistency of interest” and positive high-arousal emotions, and the correlation between “adaptability to situations” and negative high-arousal emotions. This can be attributed to the influence of Confucianism on Chinese culture, which emphasizes the importance of expressing emotions in an implicit and reserved manner. As a result, Chinese students may not directly express their emotions during the learning process. This can lead to a higher expression of low-arousal emotions and a lower expression of high-arousal emotions. Therefore, it is important to consider the impact of cultural factors on the emotional expression of college students.

7. Conclusion

This study investigates the correlation between academic emotion and grit among 138 Chinese college students. The results show that academic emotion is correlated with college students’ grit to some extent. Based on the findings of this study, the following pedagogical implications can be concluded. First, teachers should pay attention to students’ academic emotion and strive to create an active learning environment. Understanding students’ emotional states can help teachers identify students’ mental problems precisely and take timely action. Second, teachers can use diverse teaching methods, relate learning to real-life contexts, and provide engaging learning materials to ignite students’ interest.

Although this study sheds light on the interaction between personality traits and emotions, it is important to acknowledge the following limitations. Firstly, the research participants were 138 college students from science classes. Therefore, there was a relatively uneven distribution in terms of gender. Further validation of the generalizability of the research results is needed by recruiting college students from various majors. Secondly, the self-reported questionnaires in this study may fail to capture the dynamic nature of college students’ academic emotion. Future studies could consider longitudinal designs to track the changes in academic emotion and grit by adopting more real-time physiological measures such as blood pressure, eye movement, and so on. Thirdly, the present study only testified to the correlation between academic emotion and grit. It would be worthwhile to explore the impact of additional individual traits or abilities on college students’ academic emotion and grit, such as the interaction mechanism of self-efficacy, motivation, emotional regulation, and students’ grit. Last but not least, it would be valuable to implement intervention research in the classroom to explore the interaction mechanism between college students’ academic emotions and grit. It will contribute to a better understanding of students’ emotions and personality traits so that teachers can accurately implement teaching methods according to college students’ emotional performance and help college students improve their academic achievements.

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