

Association Between Anxiety and Academic Procrastination among Chinese College Students: A Cross-sectional Study

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Abstract: Anxiety and academic procrastination are general among university students. And experiencing anxiety has been claimed to be related to academic procrastination. This study aims to conduct a cross-sectional investigation on the relationship in college students in China. A cross-sectional study was conducted in colleges and universities in China. Anxiety symptoms were assessed using the self-rating anxiety scale (SAS) and academic procrastination was determined by procrastination assessment scale for students (PASS). Potential confounders included age, gender, major, study program, birth place, and place of residence. Participants were divided into anxiety and non-anxiety group based on SAS score. Pearson's correlation test was used to explore association between anxiety and academic procrastination. We further performed the multivariate linear regression analysis to estimate the relationship before and after adjusting with potential confounders. A total of 523 students participated the survey and completed the questionnaire. Based on SAS threshold of 50, 258 (49.3%) subjects were classified as Non anxiety group (SAS score <50), 185 cases (35.4%) were divided into Mild anxiety group (SAS score 50-59), and 58 cases (11.1%) were divided into Moderate anxiety group (SAS score 60-69). The remaining 22 participants (4.2%) were in the *Severe anxiety* group (SAS score ≥ 70). Academic procrastination was positively associated with anxiety, additionally. This indicated that more anxious people went through more severe academic procrastination. The findings of this study provide evidence that anxiety is positively related to academic procrastination in college students in China. Higher levels of anxiety were linked to increased procrastination behaviors, particularly in academic tasks such as exam preparation and thesis writing.

Keywords: anxiety, academic procrastination, college students, cross-sectional study

1. Introduction

Academic procrastination refers to the deliberate delaying of beginning or completing academic tasks or decisions, such as studying for an exam and preparing assignments.[1] Studies indicate that about 80–95% of college students identify themselves as chronic procrastinators,[2] which significantly diminishes the quality of learning, leading to annoying effects on daily life.[3] Specifically, academic procrastination has been associated with poor academic performance (grade point average and examination score), emotional distress (stress, anxiety, and depression), physical health deterioration, and problems in social relationships, all of which can eventually decrease students' well-being.[4, 5]

Various behavioral, emotional, and cognitive factors contribute to academic procrastination, with anxiety being a particularly influential one.[6-9] Anxiety is a common negative emotion among

university students, mainly resulting from heavy academic pressure. Scholars have identified a close relationship between anxiety and academic procrastination, as procrastination often involves two key processes: a persistent tendency to delay study-related tasks and the experience of anxiety related to such delays.[10] Additionally, anxiety has a negative correlation with a great deal of other positive emotional functions such as self-regulating and self-esteem.[11] The dysfunctional regulation of such kinds of positive emotional functions has been implicated in the development of academic procrastination, as evidenced by previous evidence.[9] Milgram was the first to carry out a survey in 1999 among 354 Israeli adolescents and found that participants who were experienced more anxiety were more likely to procrastinate on the assignments.[12] Another study in 2018 included 60 second-year students in the Latvia University of Life Sciences and Technologies and observed a positive correlation between the situational and personal anxiety and the academic procrastination level.[7] Consistent results have also been reported by Rezaei-Gazki et al., who focused on medical and dental students.[13]

Nevertheless, the paucity of data continues to limit the evidence of the connection between anxiety and academic procrastination. Moreover, the majority of previous research has overwhelmingly focused on Western populations [14,15]. Considering the effect of cross-cultural differences, additional research with non-Western populations are still warranted.[16,17] Moreover, Chinese college students, nowadays, are under great pressure, so it is of a great importance to pay attention to their mental health. Therefore, a cross-sectional study in colleges and universities in China was launched to investigate the role of anxiety in the development of academic procrastination.

2. Research design

2.1. Study design and setting

This study employs a quantitative, exploratory, cross-sectional design conducted at colleges and universities between September and November 2024, and informed consent was obtained from participants. All the undergraduate students in colleges and universities in China during the 2024/2025 academic year were eligible for the inclusion. The exclusion criteria were as follows: 1) students who did not present the informed consent; 2) students who submitted an incomplete questionnaire; 3) students who self-reported a clinically diagnosed anxiety disorder or were under treatment for anxiety disorders.

2.2. Sample selection

Non-probabilistic convenience sampling method was used in this investigation. The minimum required sample size was calculated according to the total number of undergraduate students registered in colleges and universities in China at the time of the study, based on Cochran's sampling formula [18]. A confidence level of 95%, an estimation error of 5% and an additional 10% overestimation to compensate for the lack of interest in taking part in the study were considered. Participants were recruited through online questionnaires posted on Wenjuanxing online survey platform.

2.3. Demographic information

The following demographic data were collected in the study: age, gender, major, birth place, place of residence, and study programs. Place of residence was categorized as either urban areas and rural areas, while study programs varied from 3-8 years.

2.4. Assessment of anxiety

The anxiety level of each subject was assessed using the Zung self-rating anxiety scale (SAS), developed by Zung in 1971.[19] The SAS is a 20-item self-report questionnaire, with each item scored on a 4-point Likert scale based on the frequency of symptoms over the past 7 days. The score from each item was calculated to obtain the raw score, then the row score was multiplied by 1.25 to determine the standard score, which is represented by the integer portion. The SAS standard score categorizes anxiety levels as follows: less than 50, no anxiety; 50–59, mild anxiety; 60–69, moderate anxiety; greater than 70, severe anxiety.[20] Participants with scores of 50-59 were divided in the mild anxiety group, those with scores of 60-69 were divided in the moderate anxiety group, and those with scores greater than 70 were divided in the severe anxiety group, while those who got scores < 50 were divided into the no anxiety group. The SAS has demonstrated strong reliability and validity in studies involving Chinese populations [21,22].

2.5. Assessment of academic procrastination

Academic procrastination status was evaluated by the procrastination assessment scale for students (PASS), which was initially introduced by Solomon and Rothblum.[10] The scale is composed of 26 items, measuring academic procrastination from three aspects: studying for an exam, performing administrative tasks, attending meetings and performing academic tasks. The participants rate their responses on a 5-point scale: 1 (not true at all) to 5 (true nearly all of the time) and using a 1–5 scale from 1 (never) to 5 (always). Higher scores indicated academic procrastination at higher levels. Good validity and reliability have been demonstrated for the Chinese version of procrastination assessment scale for students (PASS-C) [23].

2.6. Statistical analysis

The continuous variables were described as mean $\pm$ SD, while the categorical variables were described as frequency and percentage. Correlations between variables were examined by student's t-test or chi-square test. Pearson's correlation test was used to analyze the relationship between anxiety and academic procrastination. Moreover, a multivariate linear regression analysis was conducted to test the association between anxiety and academic before and after adjusting the effect of potential predictor factors, including age, gender, major, etc. Odds ratio (OR) and adjusted OR were calculated with 95% confidence interval (CI). Values of $P < 0.05$ were considered statistically significant. All the statistical analyses were performed with the Statistical Package for the Social Sciences (SPSS, IBM, Armonk, NY, USA), version 28.0.

3. Results

3.1. Demographic characteristics of study population

The demographic characteristics are presented in Table 1. A total of 523 participants completed the questionnaire and were finally included. Most of the participants were female (315, 60.2%). Medicine (115, 22.0%) and engineering (131, 25.0%) were two main majors. The population were divided into four groups based on SAS score, non anxiety group (258, 49.3%), mild anxiety group (185, 35.4%), moderate anxiety group (58, 11.1%), and severe anxiety group (4.2%). No significant differences across groups were observed except for gender and place of residence. Compared with the group with lower anxiety level, the group with higher anxiety level tend to include more male students and rural residents.

Table 1: Population demographic characteristics

Variable	Non anxiety (N = 258)	Mild anxiety (N = 185)	Moderate anxiety (N = 58)	Severe anxiety (N = 22)	P value
Gender, n%					0.048
Male (n=208)	109(52.4)	61(29.3)	25(12)	13(6.3)	
Female (n=315)	149(47.3)	124(39.4)	33(10.5)	9(2.9)	
Age, mean $\pm$ sd	20.566 $\pm$ 1.978	20.530 $\pm$ 1.871	20.310 $\pm$ 1.871	20.318 $\pm$ 2.885	0.790
Major, n%					0.325
Medicine (n=115)	56(48.7)	41(35.7)	13(11.3)	5(4.3)	
Engineering (n=131)	74(56.5)	42(32.1)	10(7.6)	5(3.8)	
Agricultural Sciences (n=11)	6(54.5)	3(27.3)	1(9.1)	1(9.1)	
Law (n=73)	34(46.6)	28(38.4)	9(12.3)	2(2.7)	
Literature (n=34)	17(50.0)	14(41.2)	2(5.9)	1(2.9)	
History (n=9)	6(66.7)	0	3(33.3)	0	
Philosophy (n=3)	1(33.3)	0	1(33.3)	1(33.3)	
Economics (n=25)	12(48.0)	9(36.0)	4(16.0)	0	
Education (n=8)	3(37.5)	3(37.5)	2(25.0)	0	
Natural Sciences (n=51)	25(49.0)	19(37.3)	5(9.8)	2(3.9)	
Arts (n=36)	14(38.9)	12(33.3)	7(19.4)	3(8.3)	
Management (n=27)	10(37.0)	14(51.9)	1(3.7)	7.4(9.1)	
Study program, n%					0.092
Three-year (n=37)	19(51.4)	9(24.3)	5(13.5)	4(10.8)	
Four-year (n=372)	185(49.7)	138(37.1)	37(9.9)	12(3.2)	
Five-year (n=90)	42(46.7)	31(34.4)	14(15.6)	3(3.3)	
Six-year (n=7)	4(57.1)	2(28.6)	1(14.3)	0	
Seven-year (n=3)	1(33.3)	1(33.3)	1(33.3)	00	
Eight-year (n=14)	7(50.0)	4(28.6)	0	3 (21.4)	
Birth place, n%					0.623
First and new first-tier cities (n=189)	89(47.1)	71(37.6)	23(12.2)	6(3.2)	
Other (n=334)	169(50.6)	114(34.1)	35(10.5)	16(4.8)	
Place of residence, n%					0.027
Urban (n=383)	199(52.0)	136(35.5)	35(9.1)	13(3.4)	
Rural (n=140)	59(42.1)	49(35.0)	23(16.4)	9(6.4)	

3.2. Performance of academic procrastination

The average score of all participants on each part of the PASS scale was as follows: Thesis Writing (3.082 $\pm$ 0.0378), Final Exam Preparation (3.108 $\pm$ 0.038), Academic Management (2.656 $\pm$ 0.040), Reading Task (3.043 $\pm$ 0.040), Practical Task (2.676 $\pm$ 0.039), and General School Activity (2.620 $\pm$ 0.036) (Figure 1). The results indicated that the respondents were more likely to procrastinate when preparing for the review of the final exam, writing a thesis or completing a reading task. The average score of PASS was 17.185 $\pm$ 0.172.

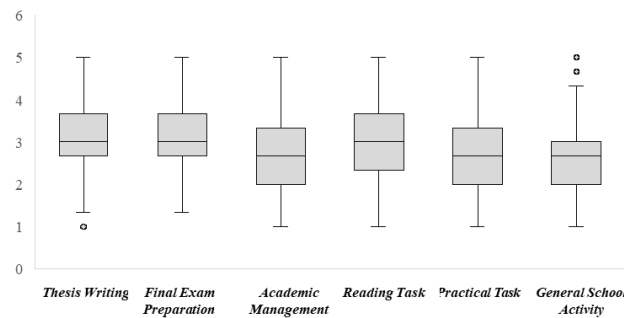


Figure 1: Comparative analysis of learning procrastination scores

3.3. Association between anxiety and academic procrastination

Figure 2 demonstrates the academic procrastination performance in different anxiety groups. The mild anxiety, moderate anxiety, and severe anxiety group were all associated with a significantly higher score of PASS, compared with the non anxiety group. Comparisons were made to highlight the differences of PASS score across different anxiety levels in those with SAS score > 50. Compared with the mild anxiety group, the severe anxiety group showed significantly higher PASS score ($p = 0.004$) while the PASS score in the moderate group was at almost the same level ($p = 0.934$). The participants in severe anxiety group was also observed with significantly more severe procrastination performance when comparing with those in moderate anxiety group ($p = 0.015$). This indicated that Individuals with higher levels of anxiety tended to experience more severe academic procrastination.

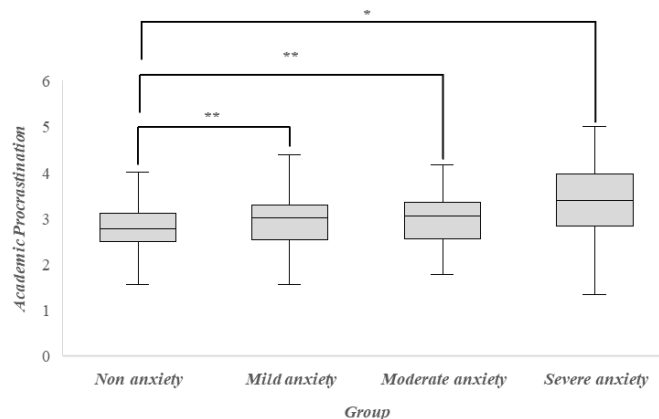


Figure 2: Difference analysis of learning delay under different anxiety levels

3.4. Linear regression model test

The results of linear regression analysis showed that different anxiety level has different effects on Academic Procrastination (Table 3). For participants in the non anxiety group, the PASS score showed a positive relationship with the SAS score after adjusting for potential confounders ($\beta = 0.027$, $p = 0.006$). Similar results were seen in the mild anxiety group as well ($\beta = 0.022$, $p = 0.017$). However, the procrastination behavior showed a negative relationship with anxiety level when the level reaches moderate ($\beta = -0.033$, $p = 0.032$) or severe ($\beta = -0.013$, $p = 0.029$), although the difference was not significant. This result may suggested that academic procrastination may be resisted when the level of anxiety reached a certain point.

Table 2: Association between anxiety and academic procrastination

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Constant	1.519** (0.265)	0.506 (0.545)	1.663 (0.893)	1.296 (1.068)	4.778* (1.805)	5.591* (2.572)	3.911 (1.930)	1.088 (3.916)
Anxiety	0.028** (0.006)	0.027** (0.006)	0.024* (0.017)	0.022* (0.017)	-0.028 (0.028)	-0.033 (0.032)	-0.007 (0.024)	-0.013 (0.029)
Gender		0.148 (0.077)		0.270** (0.100)		0.167 (0.176)		-0.504 (0.055)
Age		0.019 (0.019)		-0.016 (0.013)		-0.036 (0.053)		0.112 (0.105)
Major		0.013 (0.011)		-0.062 (0.063)		-0.064 (0.130)		0.093 (0.065)
Study program		0.003 (0.046)		0.022 (0.096)		0.076 (0.167)		0.100 (0.215)
Birth place		0.202* (0.082)		0.147 (0.107)		0.137 (0.178)		0.629 (0.668)
Place of residence		0.030 (0.091)		-0.156 (0.270)		-0.069 (0.214)		-0.064 (0.646)
R2	0.077	0.120	0.011	0.066	0.017	0.094	0.004	0.189
Adjusted R2	0.074	0.095	0.006	0.029	-0.001	-0.032	-0.045	-0.216
N	258		185		58		22	

Model 1&2: group = *Mon anxiety*; Model 3&4: group = *Mildly anxiety*; Model 5&6: group = *Moderate anxiety*; Model 7&8: group = *Severe anxiety*. The dependent variable was the overall level of *Academic Procrastination*. Standard error in parentheses.

4. Discussion

This study aimed to explore the association between anxiety and academic procrastination among college and university students in China. In a cross-sectional study examining the relationship between anxiety and procrastination among college and university students in China, it was discovered that a correlation exists between anxiety and procrastination, while age, region, gender, and major appear to have no correlation with procrastination behaviors. The findings revealed a significant positive correlation between anxiety levels and academic procrastination, which was consistent with previous literature.[12-13, 24,]The data showed that *Final Exam Preparation* and *Thesis Writing* were the most procrastinating areas, such high-weight, long-period tasks were often accompanied by stronger outcome anxiety, which may trigger individual avoidance mechanisms - when students perceived that exam scores or paper quality had a decisive impact, they were more likely to fall into a vicious circle of insufficient preparation, increased anxiety, and continuous procrastination. Notably, the level of procrastination in daily *academic management* was relatively low. This "low-risk" task (e.g. course selection, group meeting, etc) may be effective in curbing the tendency to procrastinate. Moreover, one notable finding was the differential impact of anxiety severity on procrastination. In Linear regression model test It was found that medium-high anxiety may have unexpectedly resisted academic procrastination and promoting active learning, while mild and moderate anxiety were positively associated with procrastination. This suggests that at high levels of anxiety, students may experience heightened stress that forces them to take action, reducing procrastination. However, due to the significant sample size, this study could not draw further conclusions. This finding warrants further exploration, as it challenged the linear assumption of the anxiety-procrastination relationship.

Despite its contributions, this study has several limitations. First, the cross-sectional design only proves a positive correlation between anxiety and procrastination, but it does not prove their causation. Longitudinal studies are needed to explore potential causal relationships and mechanisms. Second, the sample size, though adequate for initial analysis, was relatively small and most of them are from Sichuan University, so there may be some biases; Third, the scale we used were self-reported scale which may lead to some bias.

5. Conclusion

In summary, this cross-sectional study provided evidence that anxiety was positively related to academic procrastination among Chinese college students, which indicated that higher anxiety levels were generally associated with more severe academic procrastination, particularly in tasks such as final exam preparation and thesis writing. However, the relationship between anxiety and procrastination was complex. Notably, moderate and severe anxiety levels appeared to have a negative correlation, suggesting that certain level of anxiety may force students to take action to reduce procrastination. This study highlighted the significant impact of anxiety on academic procrastination and underscored the need for further research to explore additional factors affecting procrastination and the underlying mechanisms. Future studies should employ longitudinal designs, and more diverse samples to confirm these findings and elucidate the causal relationships. Additionally, given that academic procrastination is prevalent among college students and it may decrease students' well-being, (inducing poor academic performance, emotional distress, physical health deterioration, and problems in social relationships), studies for potential interventions targeting anxiety management and procrastination reduction are needed, which could be beneficial for improving academic performance and overall well-being among college students.

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References

- [1] MILGRAM N, MEY-TAL G, LEVISON Y. Procrastination, generalized or specific, in college students and their parents [J]. *Personality and Individual Differences*, 1998, 25(2): 297-316.
- [2] RAHIMI S, HALL N C, PYCHYL T A. Attributions of Responsibility and Blame for Procrastination Behavior [J]. *Front Psychol*, 2016, 7: 1179.
- [3] HOWELL A J, WATSON D C. Procrastination: Associations with achievement goal orientation and learning strategies [J]. *Personality and Individual Differences*, 2007, 43(1): 167-78.
- [4] DEWITTE S, SCHOUWENBURG H C. Procrastination, temptations, and incentives: the struggle between the present and the future in procrastinators and the punctual [J]. *European Journal of Personality*, 2002, 16(6): 469-89.
- [5] GONZÁLEZ-BRIGNARDELLO M P, SÁNCHEZ-ELVIRA PANIAGUA A, LÓPEZ-GONZÁLEZ M Á. Academic Procrastination in Children and Adolescents: A Scoping Review [J]. *Children (Basel)*, 2023, 10(6).
- [6] MAMANI J, JULON J. Dimensiones de la personalidad y procrastinación académica en estudiantes de cursos online de una universidad peruana [J]. *Apuntes Universitarios*, 2021, 11: 50-65.
- [7] SAPLAVSKA J, JERKUNKOVA A. Academic procrastination and anxiety among students [M]. 2018.
- [8] ÇAPAN B E. Relationship among perfectionism, academic procrastination and life satisfaction of university students [J]. *Procedia - Social and Behavioral Sciences*, 2010, 5: 1665-71.
- [9] SVARTDAL F, LØKKE J A. The ABC of academic procrastination: Functional analysis of a detrimental habit [J]. *Front Psychol*, 2022, 13: 1019261.

- [10] SOLOMON L J, ROTHBLUM E D. *Academic procrastination: Frequency and cognitive-behavioral correlates* [J]. *Journal of Counseling Psychology*, 1984, 31(4): 503-9.
- [11] WU Y, XIE F, JIANG R. *Academic Anxiety, Self-Regulated Learning Ability, and Self-Esteem in Chinese Candidates for College Entrance Examination During the COVID-19 Outbreak: A Survey Study* [J]. *Psychol Res Behav Manag*, 2022, 15: 2383-90.
- [12] MILGRAM N, TOUBIANA Y. *Academic anxiety, academic procrastination, and parental involvement in students and their parents* [J]. *Br J Educ Psychol*, 1999, 69 (Pt 3): 345-61.
- [13] REZAEI-GAZKI P, ILAGHI M, MASOUMIAN N. *The triangle of anxiety, perfectionism, and academic procrastination: exploring the correlates in medical and dental students* [J]. *BMC Med Educ*, 2024, 24(1): 181.
- [14] BURNAM A, KOMARRAJU M, HAMEL R, et al. *Do adaptive perfectionism and self-determined motivation reduce academic procrastination?* [J]. *Learning and Individual Differences*, 2014, 36: 165-72.
- [15] KLASSEN R M, KRAWCHUK L L, RAJANI S. *Academic procrastination of undergraduates: Low self-efficacy to self-regulate predicts higher levels of procrastination* [J]. *Contemporary Educational Psychology*, 2008, 33(4): 915-31.
- [16] JIN H, WANG W, LAN X. *Peer Attachment and Academic Procrastination in Chinese College Students: A Moderated Mediation Model of Future Time Perspective and Grit* [J]. *Front Psychol*, 2019, 10: 2645.
- [17] YANG Z, ASBURY K, GRIFFITHS M D. *An Exploration of Problematic Smartphone Use among Chinese University Students: Associations with Academic Anxiety, Academic Procrastination, Self-Regulation and Subjective Wellbeing* [J]. *International Journal of Mental Health and Addiction*, 2019, 17(3): 596-614.
- [18] SAPRA R L. *How to Calculate an Adequate Sample Size?* [M]//NUNDY S, KAKARA A, BHUTTA Z A. *How to Practice Academic Medicine and Publish from Developing Countries? A Practical Guide*. Singapore; Springer Nature Singapore. 2022: 81-93.
- [19] ZUNG W W. *A rating instrument for anxiety disorders* [J]. *Psychosomatics*, 1971, 12(6): 371-9.
- [20] GAINOTTI G, CIANCHETTI C, TARAMELLI M, et al. *The guided self-rating anxiety-depression scale for use in clinical psychopharmacology* [J]. *Act Nerv Super (Praha)*, 1972, 14(1): 49-51.
- [21] ZHANG Y, LIU R, LI G, et al. *The reliability and validity of a Chinese-version Short Health Anxiety Inventory: an investigation of university students* [J]. *Neuropsychiatr Dis Treat*, 2015, 11: 1739-47.
- [22] GONG Y, HAN T, CHEN W, et al. *Prevalence of anxiety and depressive symptoms and related risk factors among physicians in China: a cross-sectional study* [J]. *PLoS One*, 2014, 9(7): e103242.
- [23] YIP M C W, CHUNG O L L. *Psychometric properties of the Chinese version of procrastination assessment scale for students* [J]. *Front Psychol*, 2022, 13.
- [24] FAN J, CHENG Y, TANG M, et al. *The mediating role of ego depletion in the relationship between state anxiety and academic procrastination among University students* [J]. *Sci Rep*, 2024, 14(1): 15568.