ORIGINAL RESEARCH

Does Low Self-Esteem Predict Anxiety Among Chinese College Students?

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Purpose: This study aimed to investigate the longitudinal relationship between anxiety and self-esteem among college students.

Participants and methods: A total of 2473 Chinese college students were tracked, with their anxiety and self-esteem levels collected annually over the four academic years. The study employed a four-wave random intercept cross-lagged panel model to examine the prospective relationship between anxiety and self-esteem.

Results: The anxiety levels were negatively associated with self-esteem over campus life. Results of the four-wave cross-lagged panel model revealed that low self-esteem maintained having subsequent negative impacts on students' anxiety levels, while the effects became progressively stronger over the four academic years. Meanwhile, no significant prospective effects were identified of anxiety levels on self-esteem.

Conclusion: The study confirmed self-esteem as one of the leading contributors to anxiety for college students and emphasized the importance of nourishing the self-esteem of students to alleviate their anxiety issues and improve their mental health at college.

Keywords: mental health, longitudinal study, reciprocal relationships, student development

Introduction

Low self-esteem, as a risk trigger for mental illness, is typically associated with a high incidence of anxiety symptoms.[1,2] The extant literature demonstrated that a high proportion of students worldwide experienced anxiety disorders.[3,4] Approximately 61% of freshman students in Bangladesh struggled with moderate to extreme anxiety;[5] around 15% of undergraduates at Franciscan University in the United States experienced severe or extremely severe anxiety.[6] Nearly half of college students in China suffered from anxiety problems, among whom 8–13% had mild anxiety, 20% moderate anxiety, and 4–6% severe anxiety.[7] Another study found that about 1 in 5 college students in Spain experienced anxiety symptoms above the normal range, which coexisted with depression and stress.[8] Similar situations also applied to other groups such as patients with cancer or inflammation,[9,10] infertile women,[11] and women with marital conflict.[12] In addition, the Covid-19 pandemic has brought unprecedented anxiety to college students.[13,14] For example, more than 70% of undergraduate students in a large public university in the United States reported that various stressors, including the lack of mental health support, social distancing, and academic delay, have led to growing anxiety levels.[15] Given the increasing prevalence of anxiety and its severe negative effects,[16–19] it is in urgent need to identify the influencing factors of anxiety problems, among which self-esteem has received wide attention.

Self-esteem was conceptualized as how individuals evaluate and perceive themselves,[2] which keeps changing over time rather than being static.[20,21] For instance, self-esteem might grow from early adolescence to adulthood.[22–24] It has been generally accepted that high self-esteem can protect individuals from harmful consequences of negative experiences such as failure.[25–27] Individuals with high self-esteem strive to overcome difficulties, while those with low self-esteem tend to avoid challenging tasks.[28] In particular, college students with low self-esteem were empirically evidenced to have higher stress hormone levels in response to difficult missions and were more likely to suffer from negative emotions and mental health problems.[29] Low self-esteem also exerted negative effects on the academic engagement and performance as well as the

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happiness of students.[28,30–32] Furthermore, the levels of self-esteem were affected by students' gender, family environment, and the educational backgrounds of their parents.[28,33–35] The self-esteem levels may also differ among college students from different nations and regions. For instance, relevant studies showed that Chinese college students scored lower in self-esteem than their counterparts in the US.[28]

Previous research has shown a negative relationship between anxiety and self-esteem generally based on cross-sectional data, which reflect only the characteristics and correlations of variables at certain time points. A growing body of longitudinal studies explored the directionality of the relationship, some of which claimed that self-esteem served as one of the primary predictors of anxiety and that college students with low self-esteem were more likely to experience anxiety.[32,36,37] For instance, a cross-sectional study of 1074 college students in Spain revealed that low self-esteem was one of the crucial factors that significantly and positively predicted anxiety disorders for students on campus.[8] Self-esteem indeed predicted the development, maintenance, and recurrence of anxiety problems,[38] and high self-esteem can buffer anxiety issues.[39] In contrast, other studies asserted that intensely stressful experiences resulted in damage to self-conceptions that consistently reduced self-esteem.[40] It has been empirically proved that clinical subjects with anxiety disorders have lower levels of self-esteem compared with nonclinical controls,[41] and that adolescents experiencing anxiety problems have lower average self-esteem levels than their healthy equivalents on average.[23] Furthermore, there was also research meta-analysing of longitudinal data suggesting that the mutual effects of low self-esteem and anxiety were relatively balanced but weak: self-esteem significantly negatively predicted anxiety, and anxiety significantly negatively led to subsequent self-esteem.[40]

Thus, some existing studies have explored the prospective relationship between anxiety and self-esteem, but relevant empirical studies among college students remain insufficient. Our study, in this way, filled this gap by examining the prospective relationship between anxiety and self-esteem for college students over the four academic years in the context of China. Our research has important practical implications that interventions should be mindful of building lasting self-esteem among college students across college years in order to reduce the risks of anxiety. We proposed the research hypotheses based on the literature review:

Hypothesis I: The anxiety levels of Chinese college students were negatively associated with their self-esteem.

Hypothesis II: There was a two-way prospective relationship between anxiety and self-esteem: low self-esteem of college students led to their subsequent anxiety, whereas anxiety levels of students also exerted prospective impacts on their self-esteem over the four years.

Methods

Participants

The dataset of the Beijing College Students Panel Survey (BCSPS) in China was used in this study, which tracked the 2008 cohort in 15 public universities in Beijing and consecutively collected information about their mental health states and demographic features over the four academic years. Stratified random sampling was adopted, and the data were representative of the overall population of the college students in Beijing.[7,35,42–44] The numbers of valid samples obtained during the four rounds were 2473, 2356, 2341, and 2240, respectively. We used *t*-tests to check whether the loss of samples was random, and the results showed that there was no significant difference between the lost and the remaining samples in the characteristics of gender, age, anxiety, and self-esteem, revealing that the samples were lost randomly. Thus, we set the lost samples of the last three rounds as missing values in the analysis of our study.

The study complied with the Declaration of Helsinki. The informed consent of the participants was obtained over the data collection process, and the ethical approval was acquired from the Ethics Committee of Tianjin University (TJUE-2022-017).

Measures

Anxiety. Depression, Anxiety, and Stress Scales 21 (DASS-21), a simplified version of the DASS-42, was used to measure anxiety in this study. The respondents were asked to report their anxiety levels with seven items on a four-point scale scored from 0 to 3, and the total scores indicated the degrees of anxiety among college students. Moreover, the

scores were multiplied by 2 so as to match against the cut-off values of the DASS-42, with the total scores ranging from 0 to 42. The reliability of the measurement was acceptable with the reliability coefficients α varying from 0.699 to 0.865 across years.

Self-esteem. The self-esteem of college students was measured with the 10-item scale, each of which has five alternatives from (1) *Strongly Disagree* to (5) *Strongly Agree*.[45] It should be noted that the study has converted the five reverse-scored items to the same direction as the other five so that the total self-esteem score varied between 10 and 50 points and that higher scores denoted higher self-esteem. The scale reliability of self-esteem was also adequate with coefficients α ranging from 0.878 to 0.887 from the freshman to the senior year.

Results
Descriptive Statistics and Correlation Analysis of Anxiety and Self-Esteem

The mean score of anxiety among Chinese college students decreased gradually from 7.44 in the freshman year to 6.83 in the senior year. Likewise, the mean score of self-esteem experienced a steady downward trend from 38.30 in the first year to 35.90 in the fourth year. Table 1 presents the correlation analysis between anxiety and self-esteem, which demonstrated that anxiety levels were significantly negatively correlated with self-esteem both within each year ($p < 0.01$) and also across years ($p < 0.01$) at college. Moreover, there were statistically significant positive associations between the anxiety levels of students in different years ($p < 0.01$); similarly, the self-esteem of students was significantly correlated in different years ($p < 0.01$). These results verified Hypothesis I, indicating that the negative associations between anxiety and self-esteem among students were durable over campus life.

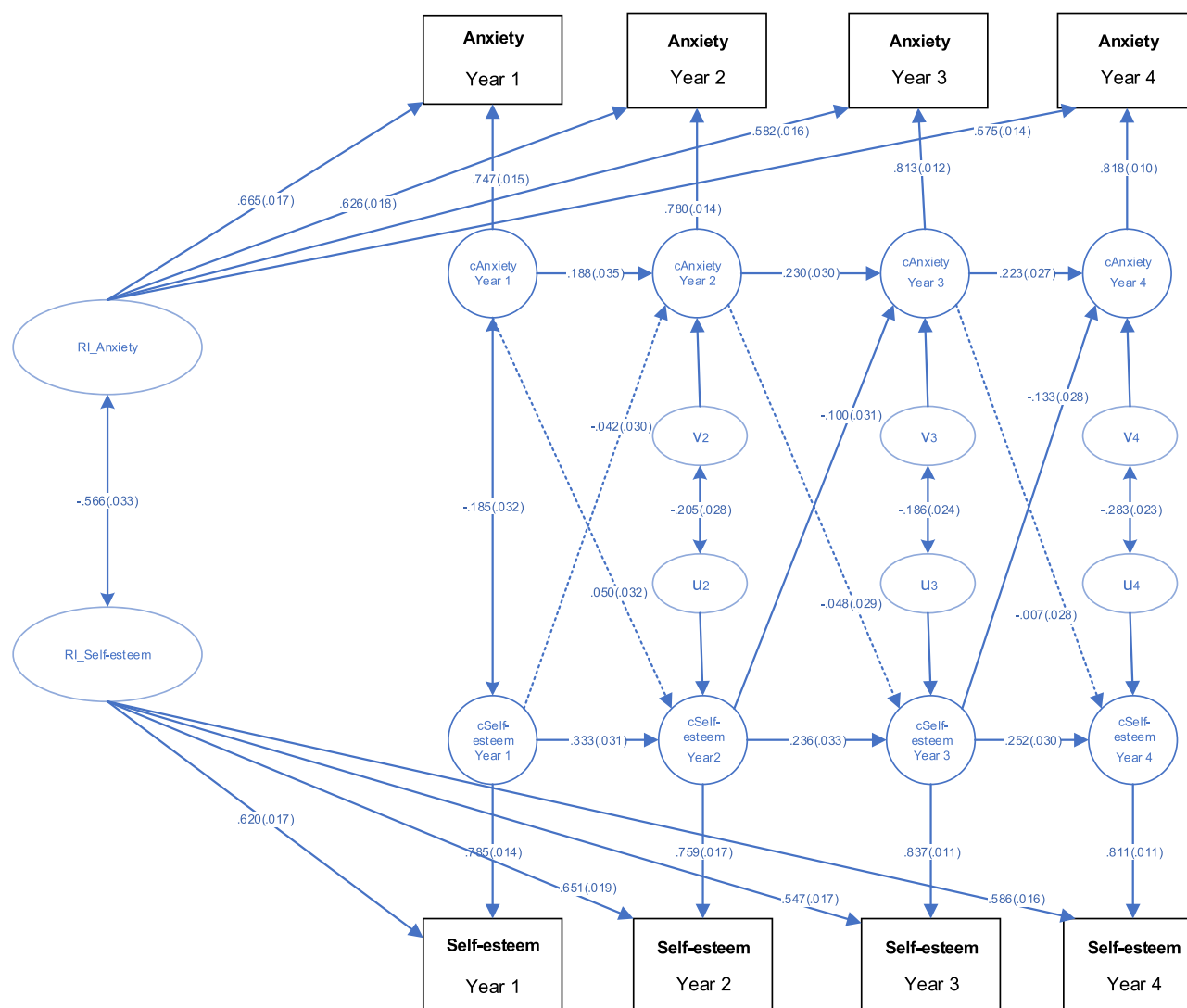## Cross-Lagged Panel Model with Random Intercepts

The autoregressive method used in the traditional cross-lag model can merely control the temporal stability of the time series. Nevertheless, Hamaker et al claimed that variable stability might take different forms, and when it is subject to a certain level of stability that does not change with time to a certain extent, including autoregressive indicators cannot capture the impact of stability well.[34] Based on the characteristics of the variables, this study constructed a four-wave random intercept cross-lagged model displayed in Figure 1. The solid line represents statistically significant paths, whereas the dashed line shows insignificant paths. Generally, the model fitted the data well, with the root mean square error of approximation (RMSEA) = 0.039, RMSEA's 90% confidence interval (C. I.) = [0.028, 0.051]; CFI = 0.994, TLI = 0.982; and the standardized root mean square residual (SRMR) = 0.022.

Results of the four-wave cross-lagged panel model revealed that scores of anxiety among students in the first year positively predicted their anxiety situations in the later three years, and the path coefficient of autoregression standardization of anxiety ranged from 0.18 to 0.23 ($p < 0.05$). Similarly, self-esteem presented strong stability over the four years,

Table 1 Correlation Analysis Between Anxiety and Self-Esteem Among College Students Over Years

Year	Variables	1	2	3	4	5	6	7	8
Year 1	1. Anxiety	1							
	2. Self-esteem	−0.344*	1						
Year 2	3. Anxiety	0.528*	−0.265*	1					
	4. Self-esteem	−0.248*	0.597*	−0.351*	1				
Year 3	5. Anxiety	0.441*	−0.259*	0.529*	−0.318*	1			
	6. Self-esteem	−0.207*	0.433*	−0.257*	0.518*	−0.334*	1		
Year 4	7. Anxiety	0.349*	−0.236*	0.407*	−0.274*	0.501*	−0.312*	1	
	8. Self-esteem	−0.181*	0.349*	−0.195*	0.433*	−0.241*	0.486*	−0.390*	1

Note: *5% significance level.

Figure 1 A four-wave cross-lagged panel model with random intercepts.

Notes: The values in the figures are standardized path coefficients, with standard errors in the parentheses. RI_Anxiety stands for random intercept for anxiety, and RI_Self-esteem represents random intercept for self-esteem. The solid lines display significant relationships, and the dashed lines suggest that the relationships are statistically insignificant.

with its path coefficient of autoregression standardization going from 0.23 to 0.34 ($p < 0.05$). After controlling for autoregression, anxiety in year 1 positively predicted self-esteem in year 2 (standardized path coefficient = 0.050, $p > 0.05$); anxiety in year 2 negatively predicted self-esteem in year 3 (standardized path coefficient = −0.048, $p > 0.05$); and anxiety in year 3 negatively predicted self-esteem in year 4 (standardized path coefficient = −0.048, $p > 0.05$). It is worth noting that across the college years, anxiety had no significant cross-lag effect on self-esteem, and the relationship between positive and negative effects was also inconsistent. By contrast, after controlling for autoregression, self-esteem in year 1 negatively predicted anxiety in year 2 (standardized path coefficient = −0.042, $p > 0.05$); self-esteem in year 2 negatively predicted anxiety in year 3 (standardized path coefficient = −0.100, $p < 0.05$); and self-esteem in year 3 negatively predicted anxiety in year 4 (standardized path coefficient = −0.133, $p < 0.05$).

In summary, the self-esteem and anxiety levels of college students showed a one-direction prospective relationship: the self-esteem of college students negatively led to their subsequent anxiety problems over the four academic years, despite that the effects were merely statistically significant from the sophomore to the senior year. However, students' anxiety had no significant impact on their subsequent self-esteem over time.

Discussion

Past research reached the consensus that anxiety was negatively related to self-esteem, yet it has not provided unequivocal evidence regarding the prospective reciprocal relationship between anxiety levels and self-esteem. This study added to the literature by exploring the directionality of the relationship among Chinese college students. It is of great importance to clarify the relationship between anxiety and self-esteem in order to accurately prevent anxiety symptoms as well as their associated negative effects and to promote the mental health of college students.

Descriptive statistics demonstrated that the average levels of self-esteem declined among Chinese college students, while their anxiety problems got alleviated over the four academic years. These differences evidenced the changing rather than static attributes of anxiety and self-esteem, suggesting that more targeted measures should be taken to relieve the anxiety problems and build lasting self-esteem for students of different years. Furthermore, the study strengthened the generalizability of the significant negative associations between anxiety and self-esteem, as proposed in Hypothesis I, which was consistent with previous studies.[23,32,36,39,41] In this regard, students' anxiety may be relieved if colleges take proper measures to build their self-esteem; meanwhile, their self-esteem levels may also be improved if their anxiety degrees get lowered. Thus, colleges should offer suitable guidance for college students to form the most favorable combination of high self-esteem and low anxiety levels.

The analysis of cross-lagged panel models yielded consistent support for the one-direction prospective relationship between self-esteem and anxiety, indicating that low self-esteem consistently predicted subsequent anxiety among students at college, despite the fact that the effects were not statistically significant from the freshman to the sophomore year yet got progressively stronger over time. Hypothesis II was partially verified that the low self-esteem of college students led to their subsequent anxiety. The empirical results of the study confirmed that self-esteem was among the leading contributors to anxiety; college students with low self-esteem were more likely to feel anxious when confronted with demanding tasks, which corresponds to the findings of Smith et al,[36] while high self-esteem helps cushion anxious situations, which has also been evidenced by Crocker et al.[39] Therefore, it is particularly necessary to improve the levels of self-esteem among college students, especially the sophomores and juniors in order to avert their subsequent anxiety disorders. In contrast, no significant prospective effects were identified of anxiety levels on self-esteem, which disagreed with other empirical research, which evidenced that intense anxiety had threatening effects on self-esteem.[23,40,41] It should be noted that the literature proved the lagging effects of anxiety on self-esteem mostly for the clinical groups and the adolescents. The clinical groups might struggle with severe anxiety disorders, which may have lasting impacts on their personality traits (such as their self-esteem). Adolescents may be easily affected by emotions, given that their personal characteristics are still in the developmental stage. Nevertheless, college students have relatively more enduring self-esteem, though normal short-term variations exist. In other words, self-esteem is one of the relatively enduring and stable traits for college students, while their anxiety levels might be more influenced by their experiences and surroundings. Therefore, our study proved that the more stable traits for individuals might exert impacts on their changeable mental states, which need to be further verified with more empirical evidence in relevant fields.

The paper provides important guiding significance to the administrative departments of colleges and universities in order to achieve a favorable combination of high self-esteem and low anxiety levels. Given that self-esteem plays a vital role in students' mental health, the faculty members should pay attention to improving the self-esteem of students through various ways to relieve their anxiety levels. Proper measures should be taken to nourish students' self-esteem with the purpose of ensuring their mental health.

Conclusion

The study concludes that the anxiety problems of Chinese college students got ameliorated on average, whereas their self-esteem degenerated gradually during the four-year span at college. Moreover, the anxiety levels were negatively associated with self-esteem over campus life. Low self-esteem consistently predicted subsequent anxiety among students at college, and the effects were progressively stronger over years; yet, no significant prospective effects were identified of anxiety levels on self-esteem.

An obvious strength is that the present study adds to the literature by clarifying the directional relationship between self-esteem and anxiety with a cross-lagged model. It is also advantageous that we tracked the same cohort of college students over four academic years, and that the sample was highly representative of Chinese college students.

Limitations of the study include that possible measurement errors or biases may arise given that both anxiety and self-esteem were measured with self-reported scales. Additionally, the levels of anxiety and self-esteem as well as their relationships may be heterogeneous for sub-groups of students (eg genders, tiers of universities), which need to be further explored in the future.

Ethical Statement

The study has been reviewed by the ethics committee of Tianjin University and has obtained the written form of ethical approval (TJUE-2022-017).

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Disclosure

The authors declare no conflicts of interest in this work.

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