Psychology Research and Behavior Management

Dovepress

open access to scientific and medical research

Open Access Full Text Article

ORIGINAL RESEARCH

The Role of Self-Esteem in the Relationship Between Psychological Capital and Anxiety of Left-Behind Experience College Students During COVID-19 Pandemic: An Online Study

Zhen-Hua Li[1]*, Jie Wang[1]*, Xin Cheng[1]*, Yi-Cheng Mao[1], Kang-Di Zhang[1], Wen-Jie Yu[1], Ying-Qing Li[1], Kai Huang[1,2], Kun Ding[1], Xiao-Jing Yang[1], Cheng-Yang Hu[3], Xiu-Jun Zhang[1,4]

[1]Department of Epidemiology and Biostatistics, School of Public Health, Anhui Medical University, Hefei, Anhui, People's Republic of China; [2]Department of Hospital Infection Prevention and Control, The Second Affiliated Hospital of Anhui Medical University, Hefei, Anhui, People's Republic of China; [3]Department of Humanistic Medicine, School of Humanistic Medicine, Anhui Medical University, Hefei, Anhui, People's Republic of China; [4]Center for Evidence-Based Practice, Anhui Medical University, Hefei, Anhui, People's Republic of China

*These authors contributed equally to this work

Correspondence: Cheng-Yang Hu; Xiu-Jun Zhang, Department of Epidemiology and Biostatistics, School of Public Health, Anhui Medical University, Hefei, Anhui, People's Republic of China, Tel/Fax +86 551 65167031; +86 551 65169635, Email cy.hu@ahmu.edu.cn; zhangxiujun@ahmu.edu.cn

Background: There is growing evidence that the COVID-19 pandemic has had a dramatic impact on public mental health. However, less attention has been paid to left-behind experience college students (LBEs). This online study aimed to investigate the relationship between psychological capital (PsyCap) and anxiety among LBEs during COVID-19 pandemic, and further analyze the mediation role of self-esteem between them.

Methods: A total of 9990 students were chosen using the stratified cluster sampling method. Three self-reported questionnaires were used to assess the PsyCap, self-esteem, and anxiety, respectively. All the statistical analyses were conducted using SPSS 23.0 and R, and to further investigate the mediation effect of self-esteem in the association of PsyCap with anxiety, AMOS 23.0 was used to build a structural equation model.

Results: PsyCap, self-esteem, and anxiety were significantly correlated among LBEs during the COVID-19 pandemic. PsyCap affects anxiety directly ($\beta = -0.22$, SE = 0.051, 95% CI: –0.27, –0.17, $P < 0.05$). In addition, self-esteem partially mediated the relationship between PsyCap and anxiety (mediating effect value = –0.16, 95% CI: –0.20, –0.13, $P < 0.05$).

Conclusion: During the pandemic of COVID-19, left-behind experience had a negative influence on the PsyCap and self-esteem of college students. In addition, for LBEs, self-esteem plays an important mediating role between PsyCap and anxiety. Therefore, from the perspective of PsyCap and self-esteem, schools should translate them into practical educational strategies to enhance the mental health and mitigate the anxiety levels of LBEs.

Keywords: left-behind experience, COVID-19, psychology, mental health

Introduction

The COVID-19 first occurred in Wuhan, Hubei, China, in December 2019,[1] and the virus spread swiftly, sweeping through several countries, it has had a tremendous impact on people's lifestyle (such as physical activity, sleep quality) and their mental well-being.[2–6] During the COVID-19 lockdown, people's physical activity is restricted and their sleep quality decreases, which affects their mental health and ultimately leads to anxiety. To control the COVID-19 pandemic, universities are teaching online through online platforms and adopting closed management to ensure student safety. For college students, the extended holidays and changes in learning and living environments may exacerbate their negative emotions such as anxiety and depression due to concerns about academic.[7] Some studies have found that the prevalence

Received: 16 January 2023
Accepted: 8 March 2023
Published: 11 March 2023

of COVID-19 and the corresponding prevention and control measures have significant negative effects on the mental health of college students.[8] And the incidence of both anxiety and depression among college students has increased.[9]

Left-behind experience college students (LBEs) are those who are now enrolled in college after one or both parents moved to other regions to work during the period of 16 years old and below, and were taken care of by relatives such as grandparents, aunts and uncles, etc., and cannot live with their parents for 0.5 years or beyond.[10] In the past few decades, with the improvement of the economic level of China and the rapid expansion of urban construction, the huge difference in economic development between urban and rural areas has led to the migration of a large number of laborers to cities, resulting in a special group of left-behind children.[11] As the left-behind children grow up, some have become college students, forming a group of LBEs. Previous studies have revealed that being left behind increases the risk of mental health issues such anxiety, sadness, suicidal thoughts, and obsessive-compulsive disorder.[12,13] The left-behind experience (LBE) has a persistent negative impact on the mental health of college students. LBEs appear to be more inferior and sensitive in interpersonal interactions, resulting in more negative emotions and lower subjective well-being.[14] LBEs appear to be more inferior and sensitive in interpersonal interactions, resulting in more negative emotions and lower subjective well-being.[15] Therefore, in the special period of COVID-19 epidemic, the mental health of LBEs may be seriously affected, with more prominent adverse psychological problems, and the incidence of anxiety and depression may be higher. While previous studies have focused more on the mental health problems of college students,[16,17] less attention has been paid to LBEs; therefore, this study will tend to observe the mental health status of LBEs, focusing on the anxiety level of LBEs and related factors.

Psychological capital (PsyCap) was first introduced by Luthans et al and defined as a positive psychological state exhibited by individuals during their growth and development.[18] PsyCap is the third major capital in addition to human and social capital. It includes four core components of self-efficacy, optimism, resilience and hope.[19] Most previous studies on PsyCap has focused on the groups of professionals, medical workers, and teachers,[20] while research on the PsyCap of LBEs is sparse. Research suggests that PsyCap can serve as a protective factor to psychologically mitigate the adverse effects of occupational stress when it arises.[21] Similarly PsyCap has been associated with psychological symptoms such as anxiety, depression, and psychological stress in college students.[22] As for LBEs, the impact of their LBE on PsyCap is still controversial.[23] And thus it is necessary to explore the relationship between PsyCap and adverse psychological problems such as anxiety and depression among LBEs.

Self-esteem is used to describe an individual's overall evaluation of his or her value.[24] Self-esteem plays an important role in maintaining college students' normal psychological status.[25] Low self-esteem is a risk factor for college students' mental health, while high levels of self-esteem can be protective, making individuals more confident and regulating relationships between people and their environment, and they are less likely to suffer from adverse psychological problems such as anxiety depression and suicidal ideation compared to low self-esteem college students.[26] As with PsyCap, self-esteem is an essential internal resource for coping with stress. Indeed, previous study has found a positive association between PsyCap and self-esteem,[27] as well as a negative relationship between self-esteem and anxiety.[28] Hence, it seems plausible to hypothesize that individuals with high PsyCap have higher self-esteem and lower anxiety, and that self-esteem mediates the relationship between PsyCap and anxiety.

Anxiety is the most likely adverse emotional problem in early formative life,[29] and public psychological stress has grown as a result of the COVID-19 outbreak, leading to an increase in the amount of negative psychological feelings such as anxiety and melancholy.[30] For college students, especially the special group named LBEs, they experience many stressful events related to the epidemic due to a series of prevention and control measures after returning to school, leading to more prominent anxiety, which can easily cause serious consequences such as poor sleep quality, poor academic performance and even suicide attempts among students.[31] Therefore, in the post-pandemic era, it is necessary to protect LBEs from anxiety by understanding whether PsyCap and self-esteem are related to anxiety and exploring their potential associations.

In this study, we proposed three hypotheses based on the aforementioned description: 1) whether college students' PsyCap, self-esteem, and anxiety levels are affected by their LBE; 2) among LBEs, PsyCap is positively linked to self-esteem and adversely linked to anxiety; 3) self-esteem plays a mediating effect in the association of PsyCap with anxiety

among LBEs. The main aim of this study is to examine the relationship between PsyCap and anxiety in LBEs, and the mediating effect of self-esteem.

Methods

Study Design and Participants

Based on a cross-sectional design, the survey was conducted at major universities in Anhui Province between September 2020 and November 2020. We calculated the corresponding sample size based on the cross-sectional survey sample estimation formula, with a sample size of 2278. Participants were chosen using a multi-stage stratified cluster sampling method. In the first stage, ten sampling units (ten universities) were randomly selected from each university in Anhui Province as the primary sampling unit into the sample. In the second stage, five majors in each of the ten universities were randomly selected as secondary units into the sample. In the third stage, eight classes were randomly selected in each major, and one class was used as a unit for cluster sampling, with a group of approximately 25 students. The study flowchart is shown in Figure 1. A total of 10,240 questionnaires were distributed through Questionnaire Star, a professional online survey tool widely used in China, and 9990 valid questionnaires were finally collected with a valid recovery rate of 97.6%. In this study, power analysis finding for the sample of the study were 0.975. This investigation was conducted with the informed consent of the subjects, and has been approved by the Biomedical Ethics Committee of Anhui Medical University (No. S20200042). Other than that, the study did not offer any rewards to the participants.

Study Survey Instruments

Basic Information Questionnaire

Basic demographic characteristics such as gender, age, grade level, and family affluence scale (FAS)[32] were collected for the study participants.

Psychological Capital Scale

Luthans et al created the PsyCap scale.[18] The PsyCap level in this study was measured by the Chinese version of the PsyCap scale.[23] The scale included 26 items, including four dimensions of self-efficacy, resilience, hope, and optimism. Each of the four subscales has 7, 7, 6 and 6 items. Using a seven-point scale each item. The lowest score was 1 (very inconsistent) and the highest was 7 (very inconsistent). Items 8, 10, 12, 14 and 25 are reversed, the other items are scored in a positive way. The lowest positive psychological capital questionnaire (PPQ) score is 26 and the highest is 182. A higher score indicates a higher

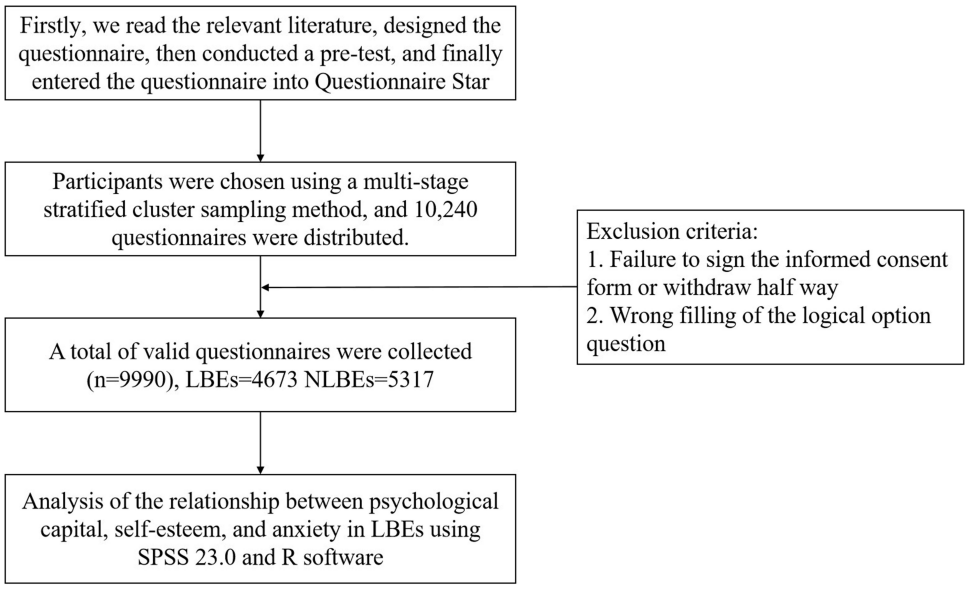

Figure 1 The study flowchart.

level of PsyCap. Cronbach's coefficients for the total scale and each of its dimensions were 0.93, self-efficacy 0.90, resilience 0.77, hope 0.86, optimism 0.85. The Kaiser-Meyer-Olkin (KMO) value of the total scale is 0.96.

Self-Esteem Scale

The Chinese version of the self-esteem scale compiled by Rosenberg in 1965 is a classic scale used to measure overall self-esteem. There are 10 items on the scale. The scale adopts four-point scoring method, with 1~4 points representing extremely inconsistent, inconsistent, consistent and extremely consistent. The overall score varies between 10 and 40. The higher the score on the scale, the higher the self-esteem level of the subject. Among them, 3, 5, 8, 9 and 10 are scored in reverse. However, item 8 should be scored in forward or deleted due to the cultural differences between China and the West.[33] Therefore, item 8 is scored in forward in this study. In this study, the Cronbach'α coefficient for the scale was 0.87 and the KMO value was 0.90.

Self-Rating Anxiety Scale

The anxiety level was measured by the Self-rating Anxiety Scale developed by Zung,[34] which is widely used to measure the severity of individual anxiety states. It consists of 20 items, rated on a scale of 1 to 4 (1 = no or little time; 2 = a small amount of time; 3 = often; 4 = most of the time/always). Among them, 5, 9, 13, 17, 19 are reverse scoring. The scoring method is to add the total scores of each question to get the original score, and multiply the original score by 1.25 to get the standard score as an integer. A higher score indicates a higher level of anxiety. The critical score is 50 and the standard score ≥ 50 indicates the existence of anxiety. In this study, the Cronbach'α coefficient for the scale was 0.86 and KMO value was 0.94.

Statistical Analysis

All statistical analyses were carried out using IBM SPSS Statistics 23.0 and R software. Firstly, categorical variables were described by frequency and percentage. Continuous variables were tested for normality. If the data obeyed normal distribution, they were described by ($\bar{X} \pm S$), differences were described by *t*-test and one-way ANOVA. If they did not obey normal distribution, they were described by median or quartiles and analyzed using nonparametric tests. Statistical significance was considered when $p < 0.05$ (two-tails). Secondly, the "corrplot" function analysis in R software was used to explore whether there was an association between PsyCap, self-esteem, and anxiety among college students. Finally, AMOS 23.0 is used to build a structural equation model that tests the proposed relationships between variables using maximum likelihood estimates of sample covariance matrices. In these models, anxiety symptoms were modeled as dependent variables, PsyCap as independent variables, and self-esteem as mediating variables.

Results

General Demographic Characteristics of Participants

The general demographic characteristics of the participants are presented in Table 1. Of the 9990 college students surveyed, 4673 (46.7%) were LBEs and 5317 (53.3%) were NLBEs. The number of male and female participants did not differ significantly, with 48.6% and 47.3% of LBEs and NLBEs being male, respectively. The majority of participants were aged 18 to 20 years (70.1% for LBEs and 74.2% for NLBEs). In terms of grade level, there were more freshmen and sophomores and juniors, together accounting for 89.8%. They accounted for 89.9% and 89.7% of LBEs and NLBEs, respectively. In terms of FAS, there are more medium FAS (52.1%), and 32.4% and 17.8% of lower FAS in LBEs and NLBEs, respectively.

Comparison of the Scores of Each Scale Among LBEs and NLBEs

As shown in Table 2, the differences between LBEs and NLBEs in total PsyCap and the dimensions of self-efficacy, optimism, hope, and resilience were statistically significant ($P < 0.001$), and the scores of LBEs were lower than those of NLBEs. In terms of self-esteem, the scores of LBEs were all lower than those of NLBEs, and the difference was statistically significant ($P < 0.001$). In terms of anxiety, the anxiety scores of LBEs were higher than those of NLBEs and the difference was statistically significant.

Table 1 The General Demographic Characteristics of the LBEs and NLBEs (N =9990)

Variable	Total (n=9990)	LBEs (n=4673)	NLBEs (n=5317)
	No. (%)	No. (%)	No. (%)
Total	9990 (100)	4673 (46.7)	5317 (53.3)
Gender			
Male	4788 (47.9)	2272 (48.6)	2516 (47.3)
Female	5202 (52.1)	2401 (51.4)	2801 (52.7)
Age			
≤17	803 (8.0)	375 (8.0)	428 (8.0)
18	3180 (31.8)	1330 (28.5)	1850 (34.8)
19	2256 (22.6)	1049 (22.4)	1207 (22.7)
20	1783 (17.8)	896 (19.2)	887 (16.7)
21	1024 (10.3)	507 (10.9)	517 (9.8)
≥22	944 (9.4)	516 (11.0)	428 (8.0)
Grade			
1st	5719 (57.2)	2583 (55.3)	3136 (59.0)
2ed	1696 (17.0)	819 (17.5)	877 (16.5)
3rd	1557 (15.6)	799 (17.1)	758 (14.2)
4th	908 (9.1)	435 (9.3)	473 (8.9)
5th	110 (1.1)	379 (0.8)	73 (1.4)
FAS			
Low	2456 (24.6)	1512 (32.4)	944 (17.8)
Medium	5201 (52.1)	2457 (52.6)	2744 (51.6)
High	2333 (23.4)	704 (15.0)	1629 (30.6)

Table 2 Comparison of Psychological Capital and Its Dimensions as Well as Self-Esteem and Anxiety Scores Among LBEs and NLBEs (N=9990)

Variable	Left-Behind	Non-Left-Behind	*t*	*P*
PsyCap	123.01±20.46	126.59±20.88	8.652	<0.001
Self-efficacy	31.40±6.79	33.59±6.18	8.701	<0.001
Optimism	29.99±5.87	30.80±5.90	6.815	<0.001
Hope	30.03±5.75	30.96±5.78	8.022	<0.001
Resilience	30.58±6.70	31.25±7.03	4.851	<0.001
Self-esteem	29.02±4.21	29.92±4.42	10.37	<0.001
Anxiety	42.77±9.79	41.50±9.53	6.554	<0.001

Correlation Coefficients Among Items

We determined the correlation coefficients of all items for LBEs, as shown in Figure 2. PsyCap and its dimensions were positively correlated with self-esteem among LBEs. Self-esteem, PsyCap and its dimensions were negatively correlated with anxiety.

Structural Equation Modeling of the Effects of PsyCap and Self-Esteem on Anxiety Among LBEs

The dependent variable was anxiety, the independent variable was PsyCap, and the mediating variable was self-esteem. For fitting analysis, a structural equation model of the relationship between PsyCap, self-esteem, and anxiety was created, and the results of each evaluation index indicated that the structural model of the relationship between

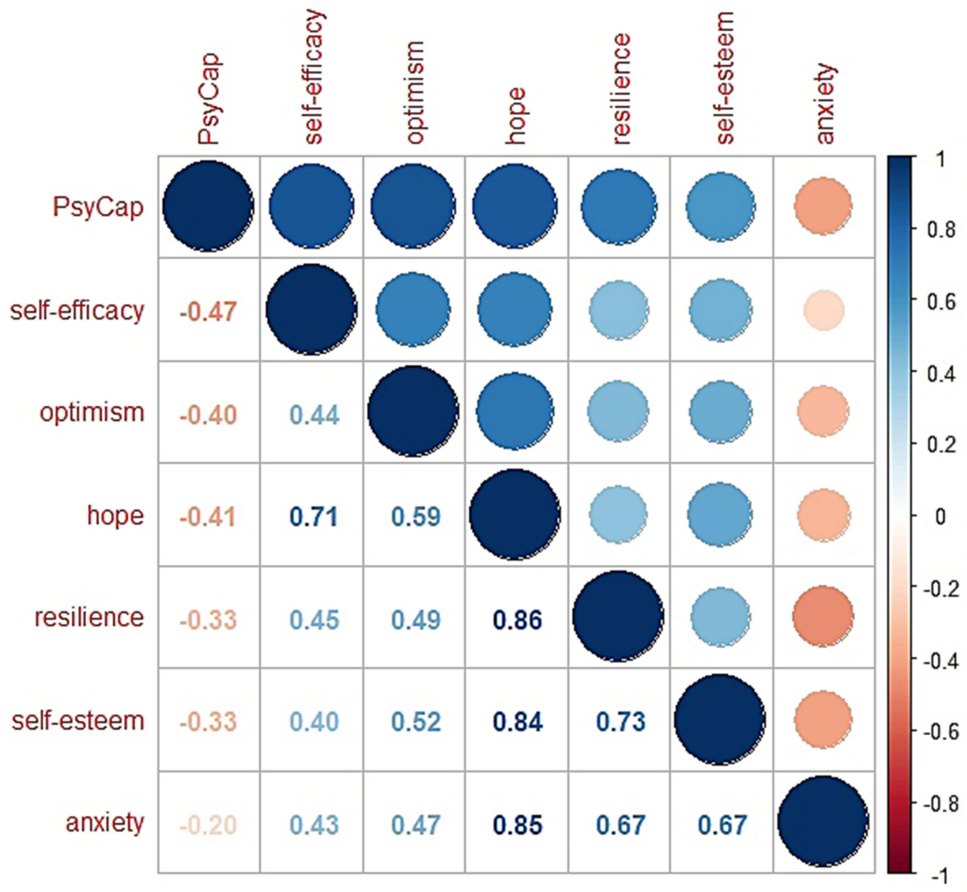

Figure 2 Pearson's correlations among 7 items in LBEs (N = 4673).

PsyCap, self-esteem, and anxiety fit well. As shown in Figure 3 and Table 3, analysis of the total indirect effect showed that self-esteem mediated the relationship between PsyCap and anxiety to some extent (β = –0.22, SE = 0.051, 95% CI: –0.27, –0.17, $P < 0.05$). Through the mediating effect of self-esteem, PsyCap had an indirect influence on anxiety (mediating effect value = –0.16, 95% CI: –0.20, –0.13, $P < 0.05$); Self-esteem was positively correlated with PsyCap (β = 0.61, SE =0.023, 95% CI: 0.57, 0.65, $P < 0.05$); anxiety was adversely correlated with self-esteem (β = –0.27, SE = 0.039, 95% CI: –0.32, –0.22, $P < 0.05$). The path coefficients between all variables were significant. The bootstrap method was applied to analyze the mediation process, with 5000 replicate samples, and it was found that none of the bootstrap 95% confidence intervals for the path coefficients contained 0. Thus, it was indicated that in the link between PsyCap and anxiety, self-esteem plays a partially mediating effect among

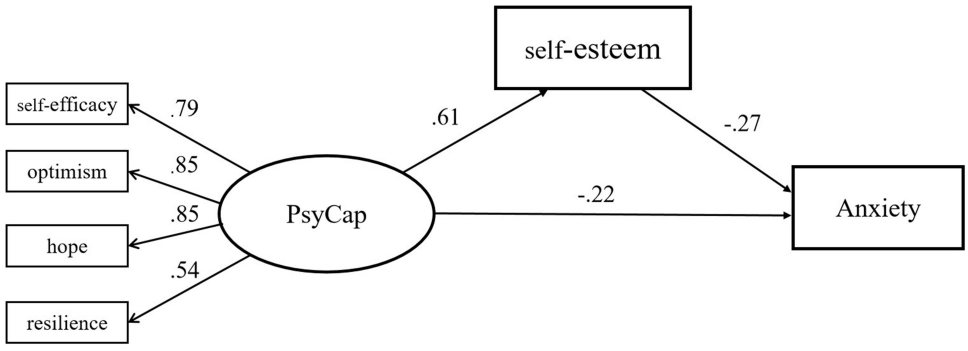

Figure 3 Structural equation model of the mediating role of self-esteem between PsyCap and anxiety.

Table 3 The Path Coefficients of the Mediation Model

Direction	β	S.E.	95% CI	*P*
PsyCap → Self-esteem	0.61	0.023	0.57, 0.65	0.0004
Self-esteem → Anxiety	−0.27	0.039	−0.32, −0.22	0.0004
PsyCap → Anxiety	−0.22	0.051	−0.27, −0.17	0.0004

Abbreviations: β, the standardized path coefficient; S.E., the standard error.

LBEs. In addition, we also analyzed the mediating role of self-esteem in the relationship between PsyCap and anxiety among NLBEs. Similarly, the mediating role of self-esteem in the relationship between PsyCap and anxiety was also existed (results not shown).

Discussion

The outbreak of the COVID-19 epidemic has had a profound impact on all aspects of society. Various mental health problems have emerged across populations around the world to varying degrees.[35,36] Foreign studies have shown that two vulnerable groups, youth and elderly, are fearful of COVID-19 during the lockdown and post-lockdown period.[37] The stricter public health measures used in China to prevent and control the spread of COVID-19 may have adversely affected people's mental health.[38] Due to the fact that college students often lack experience dealing with public health emergencies and behave more impulsively, college students often show more intense emotional reactions and inevitably develop negative psycho-emotional problems such as panic, anxiety, and depression as a result of long-term closed management and COVID-19 epidemic periods.[39] The psychological problems of LBEs may be more numerous and complex than those of other college students because they are a special group. It is particularly important to teach children how to regulate their negative emotions and protect their physical and mental health. The purpose of this study was to explore the relationship between PsyCap, self-esteem, and anxiety among LBEs during the COVID-19 epidemic, and to analyze the mediating role of self-esteem in the association of PsyCap with anxiety. This study showed that the detection rate of anxiety symptoms among LBEs during the COVID-19 epidemic was 22.1%, which was slightly lower than the study for Wuhan students[8] and slightly higher than the medical students in Shenyang.[40] It is possible that the lower detection rate of anxiety than Wuhan students was due to the fact that the students had made more awareness of COVID-19 after a series of control and prevention measures and publicity tools had been implemented at the beginning of the outbreak. However, due to the weaker resilience and psychological tolerance of LBEs, the anxiety level would be higher than that of other students during the same period.

The psychological responses of college students after exposure to stressful events are heterogeneous, such as differences in the mental health between college students of different genders during the COVID-19 period. Similarly, LBEs and NLBEs have differences when dealing with stress.[41] The present study found that LBEs during the COVID-19 endemic period had lower PsyCap and self-esteem scores, but higher anxiety scores than NLBEs. Our results indicate that the LBE during childhood negatively impacts the mental health of college students, which was consistent with previous study,[15] and finally confirmed the first hypothesis. Thus, parents play a crucial role in raising their children that cannot be replaced by grandparents.[42] Having both parents provide emotional and life support during childhood is extremely beneficial to a person's long-term accomplishments and well-being. In the absence of communication with parents during childhood, college students are more likely to suffer from mental health problems such as low PsyCap, low self-esteem, anxiety, and depression.[43]

This study found that the PsyCap of LBEs was positively related to self-esteem and negatively related to anxiety, which supports hypothesis 2. Previous study has also found that having a high degree of PsyCap predicts having a low level of anxiety,[44] which was consistent with the results of this study and indicated that PsyCap is an important protective factor for LBEs against anxiety. It can be explained by the following aspects. First, when stressful events are experienced over a prolonged period of time, mental disorders and negative dysphoria can develop, while protective factors can minimize these effects. As a psychologically beneficial element, PsyCap can be effective in assisting college students with stress management and anxiety reduction. Second, research has

demonstrated that PsyCap predicts subjective well-being[45] and college students with high well-being are better able to cope with stressful situations, thereby actively preventing and intervening when anxiety events occur. Roche and Turliuc found that PsyCap is positively associated with mental health and plays a protective role,[45,46] which was consistent with the findings of this study. While school quarantines and prevention measures were implemented during COVID-19 outbreak control, they may have contributed to an increased risk of psychological distress among returning college students due to the restriction of freedom and delay in academic and research activities. At this time, improving intrinsic PsyCap such as optimism and hope is a protective measure for LBEs, which reduces the anxiety caused by the epidemic and other factors.

The findings of this study indicated that PsyCap is positively correlated with self-esteem is also consistent with previous research findings.[27] The development of PsyCap can assist individuals in overcoming stressors and enhancing their satisfaction and well-being at work, which can lead to a greater level of productivity. The concept of self-esteem refers to an individual's subjective experience and self-evaluation of his or her own value and ability in the social context. Students who experience greater satisfaction and well-being in their academic and personal lives may have a more positive view of their own capabilities. Thus, PsyCap can function as a catalyst for the development of students' self-esteem, and higher levels of PsyCap can be associated with higher levels of self-esteem. Moreover, self-esteem and anxiety were found to be strongly adversely correlated, which is in agreement with Hasani's findings.[47] There is a significant correlation between high levels of self-esteem and low levels of anxiety, and when confronted with a public health emergency such as COVID-19, students with varying levels of self-esteem have different coping strategies. In order to reduce anxiety, students with high self-esteem adopt a positive coping style and have a more positive and optimistic outlook on life. In contrast, individuals with low self-esteem were more likely to react negatively to stressful events and to experience higher levels of anxiety when considering their vulnerability to the epidemic and possible adverse consequences.

The current study also substantiated hypothesis 3 that self-esteem plays a partially mediating role in the association between PsyCap and anxiety, with a mediating role of 42.8%. The PsyCap of LBEs can influence anxiety directly or indirectly through self-esteem. The present study hypothesized that LBEs' increased PsyCap could contribute to their increased self-esteem, thus alleviating anxiety. In addition, students with high PsyCap tend to be more optimistic and resilient, and they are more likely to accept themselves as they are. People with high self-esteem tend to have a more positive perception of themselves and are more emotionally stable in the face of stressful events. In contrast, individuals with low self-esteem tend to have a lower level of self-approval, which may lead to greater levels of anxiety.[33]

Living and studying at university is an important stage in the lives of LBEs, however, due to the COVID-19 epidemic, their environment has changed. Post-epidemic students may be more likely to experience negative emotions such as anxiety and depression when compared to the previous university days, indicating that schools should not only conduct training courses for LBEs, but also focus on their psychological health status and changes as well. In addition, schools should regularly conduct activities aimed at channeling psychological problems in order to enhance the PsyCap of college students, making them more aware of themselves, accepting themselves, handling stressful events positively and relieving psychological stress. In addition to promoting their own mental health level, paying attention to their mental health status enables them to cope better with stressful events they may encounter in the future.

There are several limitations to our study. Firstly, it is a self-reported online study. Since the self-report is measured by subjective indicators, participants may exaggerate or reduce the self-reported results, resulting in report bias. Secondly this is a cross-sectional study and it is difficult to determine the causal relationship between the variables. We need to do a longitudinal study to determine their causal relationship in the future. Thirdly, this study is limited to only LBEs, so extrapolating results to other populations should be done with caution.

To the best of our knowledge, this is the largest study that investigated the association of LBEs' PsyCap, self-esteem and anxiety. This study has two advantages. The majority of previous studies on PsyCap have focused on social workers and enterprise workers, whereas the present study focuses on college students, filling a gap in the existing literature and opening the door for further research. Second, the present study systematically and comprehensively examined the relationship between PsyCap, self-esteem, and anxiety in LBEs, which supports the hypothesis that self-esteem plays a mediating role and provides a scientific theoretical base for mental health education for college students.

Conclusion

This study indicated that the PsyCap, self-esteem, and anxiety were associated with each other among LBEs. Specifically, self-esteem plays an important role in partially mediating the association of PsyCap with anxiety. During the COVID-19 pandemic period, from the perspective of PsyCap and self-esteem, this study is important for schools. Schools should translate it into practical prevention strategies to enhance the mental health and mitigate the anxiety levels of LBEs.

Ethics Statement

This investigation was conducted with the informed consent of the subjects, and has been approved by the Biomedical Ethics Committee of Anhui Medical University (No. S20200042). In addition, participants under 18 years of age were approved by the ethics committee to provide informed consent on their own behalf. Last but not least, our study complies with the Declaration of Helsinki.

Acknowledgments

Thanks to all the college students who participated in this survey.

Funding

This study was supported Anhui Provincial Natural Science Foundation (2008085MH263) and National Natural Science Foundation of China (82073565, 81872704).

Disclosure

The authors report no conflicts of interest in this work.

References

1. Hui D, Azhar E, Madani T, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health - The latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis*. 2020;91:264–266. doi:10.1016/j.ijid.2020.01.009
2. Akbari HA, Pourabbas M, Yoosefi M, et al. How physical activity behavior affected well-being, anxiety and sleep quality during COVID-19 restrictions in Iran. *Eur Rev Med Pharmacol Sci*. 2021;25(24):7847–7857. doi:10.26355/eurrev_202112_27632
3. Trabelsi K, Ammar A, Masmoudi L, et al. Sleep quality and physical activity as predictors of mental wellbeing variance in older adults during COVID-19 lockdown: ECLB COVID-19 international online survey. *Int J Environ Res Public Health*. 2021;18(8). doi:10.3390/ijerph18084329
4. Trabelsi K, Ammar A, Masmoudi L, et al. Globally altered sleep patterns and physical activity levels by confinement in 5056 individuals: ECLB COVID-19 international online survey. *Biol Sport*. 2021;38(4):495–506. doi:10.5114/biolsport.2021.101605
5. Dergaa I, Ammar A, Souissi A, et al. COVID-19 lockdown: impairments of objective measurements of selected physical activity, cardiorespiratory and sleep parameters in trained fitness coaches. *Excli J*. 2022;21:1084–1098. doi:10.17179/excli2022-4986
6. Essau C, de la Torre-Luque A. Adolescent psychopathological profiles and the outcome of the COVID-19 pandemic: longitudinal findings from the UK Millennium Cohort Study. *Prog Neuropsychopharmacol Biol Psychiatry*. 2021;110:110330. doi:10.1016/j.pnpbp.2021.110330
7. Ge Y, Shuai MQ, Luo J, Wenger JL, Lu CY. associated effects of meaning in life and social adjustment among Chinese undergraduate students with left-behind experiences in the post-epidemic period. *Front Psychiatry*. 2021;12:771082. doi:10.3389/fpsyt.2021.771082
8. Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res*. 2020;287:112934. doi:10.1016/j.psychres.2020.112934
9. Ma Z, Zhao J, Li Y, et al. Mental health problems and correlates among 746 217 college students during the coronavirus disease 2019 outbreak in China. *Epidemiol Psychiatr Sci*. 2020;29:e181. doi:10.1017/s2045796020000931
10. Yang Z, Cai L, Luo C, et al. Influence of the left-behind experience on self-efficacy of college students. *J Psychosoc Nurs Ment Health Serv*. 2018:1–7. doi:10.3928/02793695-20190122-02
11. Qu X, Wang X, Huang X, et al. Socio-emotional challenges and development of children left behind by migrant mothers. *J Glob Health*. 2020;10(1):010806. doi:10.7189/jogh.10.010806
12. Huang J, Nigatu Y, Smail-Crevier R, Zhang X, Wang J. Interventions for common mental health problems among university and college students: a systematic review and meta-analysis of randomized controlled trials. *J Psychiatr Res*. 2018;107:1–10. doi:10.1016/j.jpsychires.2018.09.018
13. Aryal N, Regmi P, Van Teijlingen E, Simkhada P, Mahat P. Adolescents left behind by migrant workers: a call for community-based mental health interventions in Nepal. *WHO South East Asia J Public Health*. 2019;8(1):38–41. doi:10.4103/2224-3151.255348
14. Liu H, Zhou Z, Fan X, et al. A mixed method study to examine the mental health problems of college students who had left-behind experiences. *J Affect Disord*. 2021;292:149–160. doi:10.1016/j.jad.2021.04.087
15. Liu H, Zhou Z, Fan X, et al. The influence of left-behind experience on college students' mental health: a cross-sectional comparative study. *Int J Environ Res Public Health*. 2020;17(5). doi:10.3390/ijerph17051511
16. Li Y, Zhao J, Ma Z, et al. Mental health among college students during the COVID-19 pandemic in China: a 2-wave longitudinal survey. *J Affect Disord*. 2021;281:597–604. doi:10.1016/j.jad.2020.11.109
17. Li M, Liu L, Yang Y, Wang Y, Yang X, Wu H. Psychological impact of health risk communication and social media on college students during the COVID-19 pandemic: cross-sectional study. *J Med Internet Res*. 2020;22(11):e20656. doi:10.2196/20656

18. Luthans F, Luthans KW, Luthans BC. Positive psychological capital: beyond human and social capital. *Bus Horiz*. 2004;47(1):45–50. doi:10.1016/j.bushor.2003.11.007
19. Frey R, Robinson J, Wong C, Gott M. Burnout, compassion fatigue and psychological capital: findings from a survey of nurses delivering palliative care. *ANR*. 2018;43:1–9. doi:10.1016/j.apnr.2018.06.003
20. Rasmussen V, Turnell A, Butow P, et al. Burnout among psychosocial oncologists: an application and extension of the effort-reward imbalance model. *Psycho Oncol*. 2016;25(2):194–202. doi:10.1002/pon.3902
21. Tian F, Shu Q, Cui Q, Wang L, Liu C, Wu H. The mediating role of psychological capital in the relationship between occupational stress and fatigue: a cross-sectional study among 1104 Chinese physicians. *Front Public Health*. 2020;8:12. doi:10.3389/fpubh.2020.00012
22. Bakker D, Lyons S, Conlon P. An exploration of the relationship between psychological capital and depression among first-year doctor of veterinary medicine students. *J Vet Med Educ*. 2017;44(1):50–62. doi:10.3138/jvme.0116-006R
23. Liang L, Xiao Q, Yang Y. The psychological capital of left-behind university students: a description and intervention study from China. *Front Psychol*. 2018;9:2438. doi:10.3389/fpsyg.2018.02438
24. van der Cruijsen R, Boyer BE. Explicit and implicit self-esteem in youth with autism spectrum disorders. *Autism*. 2021;25(2):349–360. doi:10.1177/1362361320961006
25. Torres C, Otero P, Bustamante B, Blanco V, Díaz O, Vázquez F. Mental health problems and related factors in ecuadorian college students. *Int J Environ Res Public Health*. 2017;14(5). doi:10.3390/ijerph14050530
26. Du H, King R, Chi P. Self-esteem and subjective well-being revisited: the roles of personal, relational, and collective self-esteem. *PLoS One*. 2017;12(8):e0183958. doi:10.1371/journal.pone.0183958
27. Wang Z, Liu H, Yu H, Wu Y, Chang S, Wang L. Associations between occupational stress, burnout and well-being among manufacturing workers: mediating roles of psychological capital and self-esteem. *BMC Psychiatry*. 2017;17(1):364. doi:10.1186/s12888-017-1533-6
28. Cheng G, Zhang D, Ding F. Self-esteem and fear of negative evaluation as mediators between family socioeconomic status and social anxiety in Chinese emerging adults. *Int J Soc Psychiatry*. 2015;61(6):569–576. doi:10.1177/0020764014565405
29. Van Zalk N, Van Zalk M. The importance of perceived care and connectedness with friends and parents for adolescent social anxiety. *J Pers*. 2015;83(3):346–360. doi:10.1111/jopy.12108
30. Sundarasen S, Chinna K, Kamaludin K, et al. Psychological impact of COVID-19 and lockdown among university students in Malaysia: implications and policy recommendations. *Int J Environ Res Public Health*. 2020;17(17):6206. doi:10.3390/ijerph17176206
31. Craske MG, Stein MB, Eley TC, et al. Anxiety disorders. *Nat Rev Dis Primers*. 2017;3:17024. doi:10.1038/nrdp.2017.24
32. Boyce W, Torsheim T, Currie C, Zambon A. The family affluence scale as a measure of national wealth: validation of an adolescent self-report measure. *Soc Indic Res*. 2006;78(3):473–487. doi:10.1007/s11205-005-1607-6
33. Pan Z, Zhang D, Hu T, Pan Y. The relationship between psychological Suzhi and social anxiety among Chinese adolescents: the mediating role of self-esteem and sense of security. *Child Adolesc Psychiatry Ment Health*. 2018;12:50. doi:10.1186/s13034-018-0255-y
34. Zung WWK. A rating instrument for anxiety disorders. *Psychosomatics*. 1971;12(6):371–379. doi:10.1016/s0033-3182(71)71479-0
35. Gómez-Salgado J, Andrés-Villas M, Domínguez-Salas S, Díaz-Milanés D, Ruiz-Frutos C. Related health factors of psychological distress during the COVID-19 pandemic in Spain. *Int J Environ Res Public Health*. 2020;17(11):3947. doi:10.3390/ijerph17113947
36. Liu C, Stevens C, Conrad R, Hahm H. Evidence for elevated psychiatric distress, poor sleep, and quality of life concerns during the COVID-19 pandemic among U.S. young adults with suspected and reported psychiatric diagnoses. *Psychiatry Res*. 2020;292:113345. doi:10.1016/j.psychres.2020.113345
37. Costanza A, Macheret L, Folliet A, et al. COVID-19 related fears of patients admitted to a psychiatric emergency department during and post-lockdown in Switzerland: preliminary findings to look ahead for tailored preventive mental health strategies. *Medicina*. 2021;57(12). doi:10.3390/medicina57121360
38. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5). doi:10.3390/ijerph17051729
39. Byrnes Y, Civantos A, Go B, McWilliams T, Rajasekaran K. Effect of the COVID-19 pandemic on medical student career perceptions: a national survey study. *Med Educ Online*. 2020;25(1):1798088. doi:10.1080/10872981.2020.1798088
40. Song Y, Sznajder K, Cui C, Yang Y, Li Y, Yang X. Anxiety and its relationship with sleep disturbance and problematic smartphone use among Chinese medical students during COVID-19 home confinement — a structural equation model analysis. *J Affect Disord*. 2022;296:315–321. doi:10.1016/j.jad.2021.09.095
41. Amerio A, Bertuccio P, Santi F, et al. Gender differences in COVID-19 lockdown impact on mental health of undergraduate students. *Front Psychiatry*. 2021;12:813130. doi:10.3389/fpsyt.2021.813130
42. Wu H, Cai Z, Yan Q, Yu Y, Yu NN. The impact of childhood left-behind experience on the mental health of late adolescents: evidence from Chinese college freshmen. *Int J Environ Res Public Health*. 2021;18(5). doi:10.3390/ijerph18052778
43. Escobar D, Jesus T, Noll P, Noll M. Family and school context: effects on the mental health of Brazilian students. *Int J Environ Res Public Health*. 2020;17(17):6042. doi:10.3390/ijerph17176042
44. Cui CY, Wang Y, Zhang Y, Chen S, Jiang N, Wang L. The development and validation of the psychological capital questionnaire for patients with Cancer the psychological capital questionnaire. *BMC Cancer*. 2021;21(1):1194. doi:10.1186/s12885-021-08960-9
45. Roche M, Haar JM, Luthans F. The role of mindfulness and psychological capital on the well-being of leaders. *J Occup Health Psychol*. 2014;19(4):476–489. doi:10.1037/a0037183
46. Turliuc MN, Candel OS. The relationship between psychological capital and mental health during the Covid-19 pandemic: a longitudinal mediation model. *J Health Psychol*. 2021;13591053211012771. doi:10.1177/13591053211012771
47. Hasani S, Aung E, Mirghafourvand M. Low self-esteem is related to depression and anxiety during recovery from an ectopic pregnancy. *BMC Womens Health*. 2021;21(1):326. doi:10.1186/s12905-021-01467-2