

A Meta-Analysis of Anxiety Symptoms and Related Factors in Chinese College Students During the COVID-19 Pandemic

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Abstract: *Objective:* To explore the distribution of anxiety symptoms and related factors among Chinese college students during the COVID-19 pandemic, aiming to provide references for mental health education and management strategies tailored to Chinese college students amidst the pandemic. *Methods:* Both Chinese and English databases were searched to collect studies on factors related to anxiety symptoms in Chinese college students, along with surveys conducted between January 1st, 2020, and February 1st, 2023. Following the AHRQ cross-sectional study quality evaluation standards, a quality assessment of the included research data was conducted. Meta-analysis was performed using Stata 12. *Results:* A total of 1,057 references were searched, with 40 studies meeting the inclusion criteria. These studies collectively surveyed 189,005 individuals, among whom 57,456 individuals were found to exhibit anxiety symptoms. The anxiety detection rate was calculated at 25.6% (95% CI: 20.5–30.6%), significantly higher than the anxiety risk detection rate among the general Chinese population (15.8%). Gender, the impact of the pandemic on personal life, and awareness of COVID-19 were identified as factors influencing the detection rate of anxiety among college students. *Conclusions:* The anxiety levels among Chinese college students during the COVID-19 pandemic were notably severe. Consequently, university personnel should prioritize the mental well-being of these students and implement timely psychological interventions.

Keywords: COVID-19; College students; Anxiety; Meta-analysis

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1. Introduction

The COVID-19 pandemic emerged as a sudden, urgent, widespread, and highly uncertain public health crisis^[1]. This pandemic significantly impacts the lives, studies, and work of individuals, particularly college students who are in the midst of transitioning from adolescence to adulthood^[2-4]. Faced with such emergencies, college students often experience heightened emotional reactions and are more susceptible to negative psycho-emotional issues such as tension and anxiety^[5]. While several cross-sectional surveys have examined factors associated with anxiety symptoms in college students, inconsistencies and ambiguities arise due to variations in sample sizes and confounding factors, leading to debates over the accuracy of findings. In this study, meta-

analysis was employed to investigate the detection rate and factors related to anxiety symptoms among college students during the pandemic. This approach aims to provide a reference point for mental health education and evidence-based management strategies.

2. Materials and methods

2.1. Retrieval strategy

Computer searches were conducted on local PubMed, Springer, CNKI, Wanfang, Weipu, China Biomedical Literature Service, and Chinese Medical Journal Full Text Databases from January 1, 2020, to February 1, 2023, to identify studies on anxiety among Chinese college students during the pandemic. Core search terms in English included: “university students,” “college students,” “anxiety,” “factors,” and “China;” core search terms in Chinese included: “高校” (*gaoxiao*, higher education institutions), “大学生” (*daxuesheng*, higher education institution students), “焦虑” (*jiaolv*, anxiety), and “因素” (*yinsu*, factors). Specific types of anxiety such as “employment anxiety” and “social anxiety” were excluded.

2.2. Criteria for inclusion and exclusion of literature

2.2.1. Inclusion criteria

- (1) Descriptive epidemiological research literature published domestically and internationally between January 1, 2020, and February 1, 2023;
- (2) The main content of the literature involved the analysis of anxiety-related factors among Chinese college students, using tools such as the Self-Rating Anxiety Scale (SAS), Generalized Anxiety Disorder Questionnaire (GAD-7), Depression Anxiety and Stress Scale-21 (DASS-21), and Positive and Negative Affect Scale (PANAS);
- (3) The statistical data were complete, allowing for the extraction of data on the detection rate of anxiety symptoms.

2.2.2. Exclusion criteria

- (1) Literature where factors related to anxiety were mentioned fewer than twice;
- (2) Conference proceedings, descriptive research, reviews, and theses;
- (3) Incomplete data, where corresponding detection rates of anxiety disorders for each factor could not be obtained;
- (4) Repetitive research published or included.

2.3. Data extraction and classification of included literature

Initially, abstracts were screened to remove literature that significantly deviated from the paper’s title. Subsequently, the entire texts were reviewed to eliminate duplicate or incomplete literature. Literature meeting the above criteria was then extracted. Extracted data included the title of the literature, author, sample size, diagnostic tool, publication time, anxiety detection rate, anxiety-related factors, and the detection rate of each related factor.

2.4. Methodology quality evaluation

According to the observational study quality evaluation criteria of The Agency for Healthcare Research and Quality (AHRQ) in the United States ^[6], an independent evaluation was conducted on the methodological quality of the included studies. Among the 11 indicators, each meeting the criteria was scored 1 point, totaling

11 points. The quality score of the study was categorized into 0–3, 4–7, and 8–11, corresponding to low, medium, and high quality.

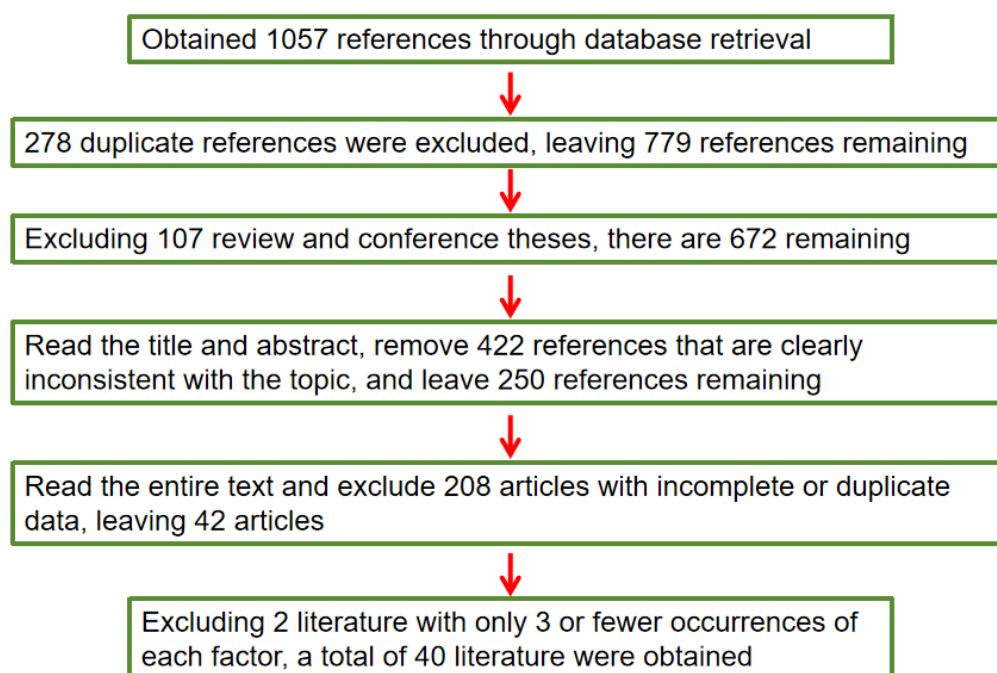
2.5. Statistical methods

The data were analyzed using Stata 12 software. The results of the merger effect were represented by a forest plot. Heterogeneity was assessed using the I^2 statistic: If $I^2 < 25\%$, no heterogeneity was considered present; if $25\% < I^2 < 50\%$, a small degree of heterogeneity was considered present; if $50\% < I^2 < 75\%$, a certain degree of heterogeneity was considered present; if $I^2 > 75\%$, significant heterogeneity was considered present. If $I^2 < 50\%$ and $P \geq 0.1$, no significant statistical difference was indicated, and analysis could be conducted using a fixed-effects model; otherwise, a random-effects model was employed.

3. Results

3.1. Basic characteristics of included literature

According to the search strategy, 40 articles were retrieved (the search process is illustrated in **Figure 1**). These articles encompassed a total of 189,005 research subjects, among whom 57,456 individuals exhibited anxiety symptoms. The survey period ranged from 2020 to January 2023, and the research spanned various regions of China. Evaluation of the included studies using the AHRQ scale revealed scores ranging from 5 to 9, indicating medium to high-quality literature.



Figures 1. Flowchart of articles identified

3.2. Meta-analysis results and heterogeneity testing of anxiety detection rate among college students during the pandemic period

Given significant differences among the studies included in the literature ($I^2 = 99.9\%$, $P < 0.01$), a random

effects model was employed to merge effect values and conduct a meta-analysis on the anxiety detection rate in each study. A total of 189,005 research subjects were surveyed, with 57,456 individuals found to have anxiety symptoms. The study determined that the incidence of anxiety symptoms among college students in this epidemiological survey was 25.6% (95% CI: 20.5–30.6%).

3.3. Analysis of factors influencing college students' anxiety during COVID-19

Among the 40 articles included in this study, factors related to anxiety symptoms among college students that were mentioned three times or fewer were excluded, leaving eight influencing factors. These factors included gender, profession, residence, being an only child, nationality, isolation status, awareness of COVID-19, and the degree of impact of the pandemic on life.

3.4. Assessment of heterogeneity and sensitivity analysis

As this study involved a single-group rate meta-analysis, no publication bias assessment or sensitivity analysis was conducted. The single-group rate provided descriptive results rather than comparison ones, with no “positive” or statistically significant outcomes.

4. Discussion

The study identified that during the COVID-19 pandemic, the detection rate of anxiety among college students in China was 25.6%, significantly surpassing the anxiety risk detection rate (15.8%) reported in the “Report on the Development of National Mental Health in China 2021–2022.” This high anxiety detection rate underscores the profound impact of COVID-19 on the living and learning environments of college students, as well as on their mental well-being ^[7].

Various perspectives emerged regarding the influence of gender on anxiety in research. Some studies, like Zheng *et al.* ^[8], indicated a notably higher detection rate of anxiety in females compared to males. This difference could stem from distinct psychological characteristics, with females often exhibiting greater susceptibility to anxiety due to factors like heightened emotional sensitivity and a lack of security. Conversely, findings from studies such as Wang suggested a lower positive rate of anxiety in females compared to males, possibly linked to male sensitivity to negative events ^[9].

While most studies indicated that the profession had no significant impact on the detection rate of anxiety, there were exceptions. For instance, Zheng *et al.* found a significantly higher detection rate of anxiety among medical students compared to non-medical students ^[8], attributed to the former's heavier academic workload and higher exam pressure. Compared with the latter, the former had a deeper understanding of infectious diseases, a wider range of professional knowledge, and a higher awareness of the epidemic, but lacked communication and was more prone to anxiety. Conversely, Jin *et al.* observed a higher proportion of non-medical students experiencing anxiety ^[10], indicating the need for further investigation into the true impact of the profession.

Research generally showed that increased knowledge about COVID-19 corresponds to a lower positive rate of anxiety symptoms among college students. While individual studies may have differed, overall, a lack of understanding about COVID-19 correlated with higher anxiety detection rates. A more accurate and comprehensive understanding of the pandemic tended to foster a more optimistic outlook, reducing the likelihood of negative emotions.

Compared to the general population, college students may have limited social activities and insufficient knowledge about COVID-19, making it challenging for them to cope with stress effectively. This could lead to unstable mental states, particularly during crises like the COVID-19 pandemic. Thus, this study suggests a

heightened focus on the mental health of college students during the pandemic, especially for those who lack an understanding of COVID-19 and experience significant disruptions in their personal lives. University staff should actively promote COVID-19 awareness and education, disseminate timely updates about the pandemic, and provide support to students facing personal challenges due to the pandemic.

5. Limitation

The inclusion, exclusion of literature, and data extraction were performed by a single individual, which may introduce bias or errors. Some included literature differed in the definition and measurement standards of influencing factors, leading to significant heterogeneity testing and potentially affecting the reliability of research results. Hence, more comprehensive and detailed research is necessary to determine the influencing factors of anxiety among college students.

6. Conclusion

During the pandemic, the detection rate of anxiety among college students in China was notably high compared to the detection rate of anxiety risk among the general Chinese population. Gender, specialization, understanding of COVID-19, and the impact of the pandemic on personal life significantly influenced the detection rate of anxiety among college students. The findings highlight the importance of focusing on the mental health of college students, particularly those who lack understanding of the COVID-19 pandemic and experience disruptions in their personal lives due to the pandemic. Providing timely support and care to these students is essential. Additionally, universities should actively implement courses in health education, mental health, and other relevant areas to enhance students' knowledge of physical and mental health, enabling them to better cope with sudden public health emergencies.

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The authors declare no conflict of interest.

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