



Comparison of Research Hotspots and Trends in Medical Students' Mental Health at Home and Abroad: A Bibliometric Analysis Based on CiteSpace

Chuang Zhang^a, Shuqing Zhang^b, Guijie Ma^c, Pan Cai^d, Zixv Hao^{c*}

Changchun University of Chinese Medicine, Changchun, 130117, China

^a715311754@qq.com, ^bm19806095817@163.com,
^c3197469600@qq.com, ^d1294299781@qq.com, ^{*}e332716553@qq.com

Abstract. Objective: To explore and compare research hotspots and evolutionary trends in medical students' mental health domestically and internationally, identifying similarities and differences. Methods: Using CiteSpace and VOSviewer, relevant literature from CNKI and WOS (2010-2026) was analyzed via bibliometric methods, focusing on publication volume, collaboration networks, and hot topics. Results: Peak publication counts were 90 (China) and 88 (international), with overall increasing trends in both. Conclusion: Research on medical students' mental health has steadily grown over time. The findings clearly demonstrate both similarities and differences between China and other countries.

Keywords: Medical students; Mental health; Bibliometrics; Comparative analysis; CiteSpace

1 Intrduction

Medical students face heavier psychological burdens due to demanding training, heavy workloads, and long education duration, leading to higher rates of anxiety and depression than general university students^[1]. These issues affect their personal growth, academic performance, and future healthcare quality. Although significant progress has been made both domestically and internationally, differences in data sources, methods, and cultural contexts have led to independent research trajectories. Most existing bibliometric studies rely on a single database and lack comparative analyses^[2]. To address this gap, this study uses CiteSpace and VOSviewer to systematically compare research hotspots and evolving trends in medical students' mental health through keyword co-occurrence, clustering, and burst detection. The aim is to provide reliable data and reference recommendations for future research.

1.1 Data Sources

Data were retrieved from CNKI and WOS Core Collection on March 23, 2026. Chinese literature (2010 – 2026) used search terms "medical students" or "students in medical

colleges/universities" and "mental health," limited to journal articles, yielding 1,175 articles after filtering. WOS (SCI-E and SSCI) used "medical students" and "mental health," limited to articles and reviews, yielding 807 articles. Exclusion criteria: non-journal publications (e.g., conference papers, dissertations, books), unavailable or duplicate full texts, studies on veterinary or part-time medical students, and topic-irrelevant documents. In the WOS and CNKI literature, this study has restricted the document languages to English and Chinese, and explicitly manually excluded a small number of documents in other languages.

1.2 Research Methods

This study employed the professional bibliometric software CiteSpace (version 6.4.R1) and VOSviewer to conduct a visualized comparative analysis of the literature from the WOS and CNKI databases. Analytical functions including keyword co-occurrence, clustering, timeline analysis, and burst detection were utilized. The software parameters were set as follows: the time slice was set to 1 year; the network pruning method was Pathfinder and Pruning the Merged Network. After running the analysis on the CNKI database, 453 nodes and 1,595 links were obtained. After running the analysis on the WOS database, 553 nodes and 3,233 links were obtained.

2 Result

2.1 Annual Publication Volume

As shown in Figure 1, annual publication volumes have increased significantly both domestically and internationally. Domestic publications remained stable between 60 and 80 from 2010 to 2026, with small incremental growth, peaking in 2021 (90 articles)—indicating strong domestic attention to medical students' mental health during this period. In contrast, international publications stayed around 10 – 20 per year before 2018, then experienced rapid growth, peaking in 2022 (88 articles), suggesting increasing global interest in this field.

2.2 Collaboration Network Analysis

In international collaboration, the United States and China occupy central positions in the network (Figure 2). The US has the largest collaboration network, covering 13 countries, with other nations forming a uniformly distributed network around it, creating a multi-layered international collaboration pattern. Regarding author collaboration, Zhang Qiumei has the highest number of publications (34 articles) and the strongest connection strength, indicating her central role in the domestic collaboration network. Among international authors, Yusoff (9 articles) and Dyrbye (7 articles) are the most productive; although others have fewer publications, their prominent connection strength suggests a high level of international collaboration and strong influence.

2.3 Country Distribution

The US leads in both publications (147) and centrality (0.44), marking its central role in international collaboration. China ranks second in publications (98) but has low centrality (0.12). Overall, the top ten countries in publication volume are mainly European/American nations and emerging developing countries, with large variations in centrality, reflecting differing levels of international collaboration participation.

2.4 Keyword Clustering Analysis

Keyword clustering used the LLR algorithm^[3]. For domestic (Table 1): $Q=0.3927$ (>0.3), $S=0.7322$ (>0.7); for international (B): $Q=0.4814$ (>0.3), $S=0.7776$ (>0.7), confirming reliable clustering. The domestic network yielded 10 clusters, integrated into five directions: sleep quality & mental health; anxiety & learning burnout; social support & coping strategies; student (including medical students) & psychological characteristics; and influencing factors analysis. Frequent keywords like "anxiety," "social support," and "learning burnout" show domestic research focuses on interactions among emotions, social resources, and academic stress. Studies confirm medical students' academic stress can directly trigger depressive emotions^[4], reflecting high attention to youth mental health. The international network yielded 9 clusters (Table 2) integrated into five directions: sleep quality; mental health & emotional distress; medical education & medical students; physical activity; and sedentary behavior. Frequent keywords like "medical education" and "physical activity" indicate greater diversity and refinement. Domestic research emphasizes negative psychological states, whereas international research focuses on macro-level educational environments and social interventions. Moreover, influenced by national policies^[5], domestic research highlights the role of state policies and social support in maintaining good mental health.

2.5 Keyword Burst Analysis

Domestic burst analysis (right side of figure 3) shows that from 2010 – 2014, "medical sciences" (5.71) and "coping styles" (5.54) had the highest burst strengths. From 2020 – 2026, "COVID-19" (6.80) and "depressive symptoms" (4.12) showed high bursts, indicating a focus on pandemic impacts, psychological mechanisms, and symptom assessment. International burst analysis (left side of figure 3) shows that from 2010 – 2013, "quality of life" (2.86) and "medical education" (2.87) led in burst strength, reflecting early attention to medical students' quality of life and burnout in medical education. From 2021 – 2026, "gender disparities" (3.29) and "network analysis" (1.88) had the highest bursts. During this period, emerging thematic terms increased, and research scope expanded, indicating that gender differences, medical education, and network analysis are future frontier trends.

Table 1. Top seven keyword clusters in international literature

Cluster Label	Keywords
#0College students	performance; insomnia; sleep disorders; positive psychology
#1Depressivesymptoms	Disorders; medical education &training; residents
#2Physical activity	School speciality; sleep quality; mobile phone addiction
#3Gender disparities	Substance; longitudinal study; academic motivation
#4Covid-19	Psychological resilience; social media; perceived stress; anxiety symptoms
#5Sedentary behavior	Coronavirus; postgraduate; trait impulsivity; delution
#6Emotional intelligence	Personality;academic achievements;academic performance;academic stress
#7Psychological distress	Coping style;cognitive fatigue;reflection;big five personality traits

Table 2. Top seven cluster labels in domestic literature

Cluster Label	Keywords
#0Sleep Quality	medical students; students; employment anxiety; medical sciences
#1Mental Health	physical activity; anxiety; sleep quality; depression
#2Anxiety	depression; stress; employment; psychology
#3Social Support	psychological resilience; psychological capital; COVID-19; interpersonal trust
#4Students	medical sciences; mental health; medical students; psychology
#5Medica lColleges	employment pressure; clinical internship; physical and mental health; graduates
#6Learning Burnout	mediating effect; psychological resilience; professional commitment; loneliness
#7Coping Styles	life events; emotional management; active procrastination; self-confidence

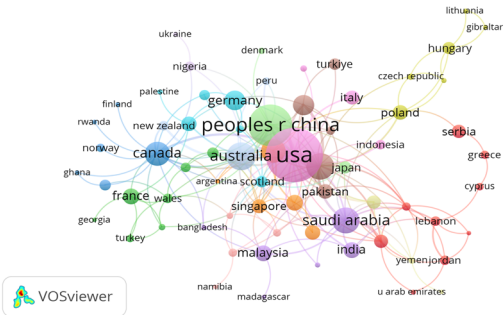


Fig. 1. National Collaboration Network.

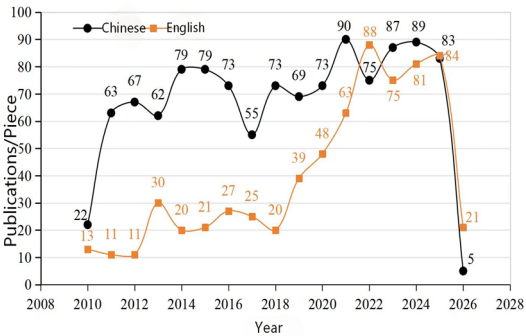


Fig. 2. Publication trends in China and other countries

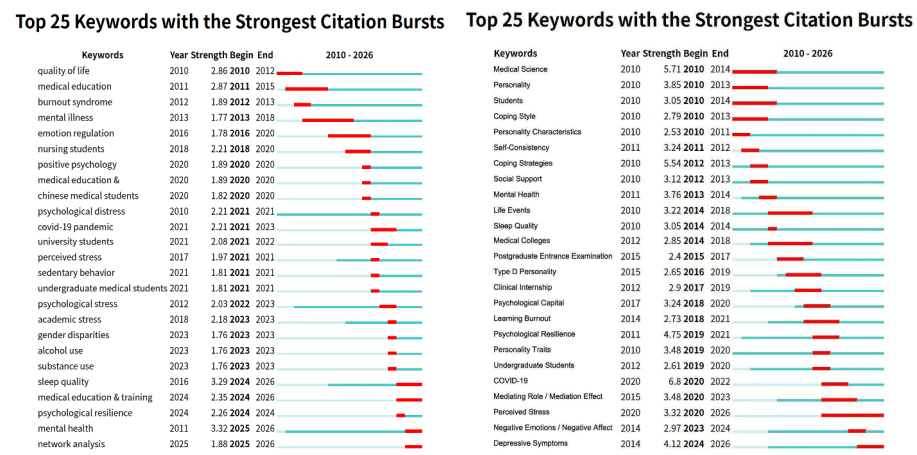


Fig. 3. Keyword bursts in domestic and international literature

3 Discussion

3.1 General Overview

Results show that from 2010 to 2026, publication numbers in this field increased overall both domestically and internationally, indicating a sustained research hotspot. Domestically, both annual output and prolific author output were significantly higher than internationally. Domestic publications showed continuous fluctuating growth over the entire period. International publications had two phases: low from 2010–2018, then a substantial rise from 2018–2025, possibly due to the pandemic's short-term impact^[6]. Regionally, the US and China had the highest publication counts and centrality, suggesting that high-output regions are also economically prosperous.

3.2 Research Hotspots and Frontier Directions

Research Hotspots.

Domestic and international research in this field has been summarized into five main areas each. Domestic topics cover: sleep quality & mental health; anxiety & learning burnout; social support & coping strategies; student population (including medical students) & psychological characteristics; and analysis of influencing factors. International topics cover: sleep quality & circadian rhythm regulation; positivity & vulnerability in psychological regulation; medical education environment & professional identity; and physical activity & sedentary behavior.

Both share a similarity: they incorporate biological, psychological, and social factors to explore mechanisms affecting medical students' mental health, reflecting a shift to a multidimensional biopsychosocial model^[7].

Differences: Domestic research focuses on intrinsic psychological factors. For example, personal resilience significantly improves medical students' mental health^[8]. In

contrast, international research emphasizes overall psychological well-being, as shown by cognitive/behavioral empathy associating with better mental health, while affective empathy shows the opposite^[9]. Recently, international studies have addressed stigma's harm on medical students' mental health and how school curriculum reforms can reduce it^[10]. Meanwhile, domestic research has explored the doctor-patient relationship's impact on medical students' psychology within the national social and medical system^[11]. Moreover, terms like "medical education" and "school curriculum" appear frequently in international research, indicating its focus on school curriculum and cultural shaping^[12]. Additionally, compared with China, international research shows greater diversity, including individual lifestyle factors such as sedentary behavior and physical activity^[13].

Frontier Analysis.

First, gender differences have become an emerging hot topic. Recent international research has deeply analyzed the impact of gender differences on medical students' mental health, confirming that psychological distress is significantly higher among female medical students than among their male counterparts^[14]. However, China has not yet conducted in-depth explorations in this area. In the future, China needs to strengthen research on the intrinsic relationship between gender differences and medical students' mental health. Second, network analysis offers a new method for precise intervention. International methodological innovations have provided new strategies for precisely intervening in medical students' mental health issues. Meanwhile, international research has also focused on the threats posed by internet use and addiction, confirming that internet addiction is closely related to emotional dysregulation^[15]. China should actively learn from international experience and apply network analysis methods to promote the sustained and healthy development of the medical student mental health field. Third, actively promote the reform of medical education systems. International research shows that most medical schools have implemented relevant teaching activities, including lectures, small-group reflections, and practical experiences, which have been highly endorsed by students, doctors, and scholars^[16]. In the future, China needs to actively learn from international research experience, accelerate the reform of medical education, optimize curriculum design and educational concepts, and integrate mental health education into mandatory medical curricula to effectively reduce the stigma associated with seeking psychological help.

4 Research Limitations

This study has several limitations. First, it only included publications from CNKI and Web of Science, potentially omitting relevant studies not in Chinese or English or not in these databases, leading to language and database bias. Thus, contributions from non-English-speaking and non-Chinese countries may be underestimated. Future research could adopt a multilingual, multi-database strategy to reduce regional bias. Second, non-article sources (books, editorials, newspapers) were excluded, which may neglect

practical insights and theoretical contributions—especially important in mental health, where national policy documents often shape research directions.

5 Conclusion

This bibliometric study systematically compares research status and trends in medical students' mental health using CNKI and WOS literature. It covers major research themes over the past 16 years in domestic and international academia, and identifies frontier areas and future directions, including the intrinsic relationships linking gender differences, network analysis, and medical education to medical students' mental health. Future research should focus on these frontiers and engage in deeper academic exchanges and collaborations to promote sustained and healthy development in this field.

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