Original Article

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Multidimensional social capital and latent anxiety severity profiles among Chinese medical graduate students: A multicenter cross-sectional study

Wen Zhu[1,§], Xin Zheng[2,3,§], Ziwei Wang[2,§], Niannian Li[1], Yue Fang[4], Zhongliang Bai[2], Jun Wu[2], Sanyuan Hao[2], Ziwen Xu[2], Jiajie Zhao[2], Ren Chen[2,5,6,*], Xiaoli Wu[7,*]

[1] Graduate Student Affairs Office, The First Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China;
[2] School of Health Services Management, Anhui Medical University, Hefei, Anhui, China;
[3] School of Public Health, Anhui Medical University, Hefei, Anhui, China;
[4] Hefei Cancer Hospital of CAS, Institute of Health and Medical Technology, Hefei Institutes of Physical Science, Chinese Academy of Sciences (CAS), Hefei, Anhui, China;
[5] The Fourth Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China;
[6] Department of Neurology, The First Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China;
[7] Hospital Director's Office, The First Affiliated Hospital of Anhui Medical University, Hefei, Anhui, China.

SUMMARY: Mental health issues, such as anxiety, are highly prevalent among medical graduate students. However, the potential relationship between social capital and anxiety symptoms in medical graduate students has not yet been investigated. Therefore, data were collected in 2024 from a multicenter sample of 2,587 medical graduate students obtained through multistage stratified sampling across northern, central, and southern Anhui Province. Anxiety symptoms were assessed using the 20-item Self-Rating Anxiety Scale (SAS-20). Social capital was evaluated across six dimensions: social participation, social support, social connection, trust, sense of belonging, and reciprocity. Latent profile analysis (LPA) was used to identify latent anxiety severity profiles. Multinomial logistic regression was used to examine associations between social capital dimensions and anxiety severity-profile membership. The prevalence of anxiety symptoms among participants was 30.5%. Three latent anxiety severity profiles were identified: low (50.6%), moderate (18.6%), and high (30.8%). Lower levels of social support, social connection, and trust were associated with greater odds of membership in the moderate- and high-anxiety severity profiles. A higher sense of belonging was associated with lower odds of membership in the high-anxiety profile, whereas higher social participation was associated with greater odds of membership in the high-anxiety profile. Compared with the moderate-anxiety profile, membership in the high-anxiety profile was also associated with higher social participation and lower trust. Cognitive social capital, particularly trust and supportive connections, was consistently associated with lower anxiety severity, whereas structural participation showed a context-dependent association. These findings suggest that the quality and context of social relationships may warrant as much attention as the quantity of participation.

Keywords: medical graduate students, anxiety symptoms, social capital, latent profile analysis

1. Introduction

The global expansion of higher education has positioned medical students as an increasingly vital component of the healthcare workforce. Statistics show that the number of medical graduates in OECD countries rose from 93,000 in 2000 to 114,000 in 2010, reaching 160,000 by 2021 (*1*). China's postgraduate medical education system comprises master's and doctoral tiers, featuring diversified training modalities such as the "5+3" integrated clinical medicine professional degree program, research-focused master's programs, and eight-year combined bachelor-master-doctoral pathways (*2*). Based on degree type, medical postgraduates are categorized into academic (PAD) and professional (PPD) tracks, with the former research-oriented and the latter focused on clinical practice skills (*2,3*). Interestingly, while the need for skilled clinical practitioners in China's healthcare system is increasing, fewer medical postgraduates have been pursuing clinical careers recently (*4,5*). Several investigations have highlighted that medical graduate students often encounter difficulties like extended academic courses, research stress (*3,6,7*) and significant financial and interpersonal burdens (*8*). Collectively,

these pressures may compromise career commitment to clinical medicine and precipitate adverse mental health outcomes.

Anxiety, a prevalent global mental disorder, notably affects medical students in this scenario. The World Health Organization states that around 4% of people worldwide experience anxiety symptoms. Research shows that medical students experience significantly greater mental health challenges than their non-medical counterparts, with anxiety disorders being the most notable difference (*9-11*). A study revealed that medical students scored 7.70 on anxiety symptoms, compared to 5.51 for workers of the same age (*11*). A meta-analysis covering 40,348 medical students showed that the prevalence of anxiety symptoms among medical students worldwide ranged from 29.2% to 38.7% (*12*).

Cross-cultural studies consistently report elevated anxiety symptom prevalence among medical students, with significant international variations. For instance, the anxiety symptom scores of medical students in Pakistani institutions were 19.2 ± 11.2, with 74% meeting moderate-to-severe anxiety criteria (*13*). A US cohort study revealed 20.3% of medical trainees met diagnostic thresholds for generalized anxiety disorder, with nearly one-third reporting clinically significant academic impairment attributable to anxiety symptoms (*14*). Research in China indicates that 33.8% of medical graduate students experience depression symptoms, while 22.2% suffer from anxiety symptoms. At the same time, more than half of the respondents experienced burnout, and 58.4% of the respondents considered leaving school (*4*).

There has been a growing interest in studies examining the influence of social capital on mental health. Social capital encompasses the resources and assistance people gain from their social connections, and it has multiple dimensions. There are two elements to social capital: structural and cognitive (*15,16*). The former comprises objective measures: social networks and participation. The latter encompasses trust in other community members, reciprocal norms, and perceived social support (*17,18*). Earlier research has investigated how social capital relates to anxiety symptoms across various groups, employing diverse methods to assess social capital and yielding varied outcomes. Research conducted on rural women in Kenya revealed that enhancing social capital (trust, cohesion) helped reduce anxiety levels in adult women (*19*). In Australia, a randomized controlled trial demonstrated that enhanced social capital—particularly interactions with friends—significantly alleviated anxiety symptoms and loneliness symptoms among elderly nursing home residents (*20*). A Japanese study examined associations between multidimensional social capital components—including fairness, trust, reciprocity, social participation, and support – and anxiety symptoms among disaster survivors. The results showed that fairness, trust, and reciprocity can serve as protective factors against anxiety symptoms, while social participation may exacerbate anxiety symptoms, and social support's impact is minimal (*21*). Interestingly, research conducted on female domestic workers in China showed that anxiety levels were not significantly related to either cognitive social capital (trust, social harmony, perceived fairness, and sense of belonging) or structural social capital (membership, support, and activity) (*22*). Another study carried out in China discovered that medical students with higher levels of social capital, including social participation, support, connections, trust, cohesion, and reciprocity, experienced significantly fewer symptoms of anxiety and depression, and this relationship was stronger in medical students compared to non-medical fields (*23*).

Although existing research has extensively examined the prevalence of anxiety symptoms among student populations, there remain significant limitations in the exploration of the underlying mechanisms. As one of the core social determinants of mental health, the role of social capital in anxiety symptoms has been preliminarily validated; however, most studies examine social capital as a single, aggregate indicator, overlooking the fundamental differences in the mechanisms of action between structural social capital (*e.g.*, social participation, social ties) and cognitive social capital (*e.g.*, trust, sense of belonging, reciprocity). The practice of simply summing up total scores tends to obscure the heterogeneous effects across different dimensions and may even underestimate the true impact due to opposing effects that cancel each other out. This is particularly true for medical graduate students, a unique population who hold dual identities as both research scholars and future clinical practitioners. They are constantly under multiple pressures—including research evaluations, clinical rotations, and professional development—and their social interactions are highly dependent on academic and professional contexts. Social participation often blends voluntary socializing, academic tasks, and obligatory work, which means that the impact of social participation on mental health may present a "double-edged sword"—it may alleviate anxiety through social support, but it may also exacerbate emotional burdens due to additional role demands and performance pressures. This unique aspect has not yet received sufficient empirical attention. According to the stress buffering model, social support, trust, and social connections can buffer academic, clinical, and occupational stress. At the same time, resource conservation theory suggests that social capital can provide emotional, informational, and instrumental resources, but participation itself may also consume time, energy, and identity resources. Based on the above, this study proposes the following research hypotheses: H1 Higher levels of cognitive social capital, particularly trust, perceived support, social connection, and belonging, are associated with lower anxiety severity. H2

Structural social capital, particularly social participation, may show associations with anxiety that differ in direction from those of cognitive social capital. We further explored whether the associations of individual social-capital dimensions with anxiety severity differed in direction and magnitude.

Furthermore, previous studies have largely used continuous scores or binary thresholds based on general norms to characterize anxiety levels, making it difficult to accurately identify the naturally occurring stratification of anxiety severity within the target population. LPA provided a data-driven complementary approach to characterize severity strata without imposing prespecified clinical thresholds. Therefore, LPA was used in this study to stratify the severity of anxiety symptoms among medical graduate students.

Overall, previous studies have largely treated social capital as a single, holistic beneficial resource, generally focusing on its protective associations with mental health while paying less attention to its potential adverse or context-dependent associations. Second, existing studies mostly use the total social capital score as the core indicator, failing to sufficiently distinguish between structural and cognitive dimensions and thereby potentially obscuring heterogeneous associations across different dimensions. Third, few studies have stratified participants by anxiety severity to examine whether different dimensions of social capital are associated with anxiety in different directions across severity levels. This study therefore aimed to identify latent anxiety severity profiles among medical graduate students and to examine how different dimensions of social capital are associated with membership in these profiles. The findings may inform the development of more targeted psychological support strategies in medical educational institutions to address anxiety symptoms.

2. Materials and Methods

2.1. Research design and data collection

This study was conducted in Anhui Province from October to December 2024, using a multistage stratified random sampling method to select study participants. Anhui Province was divided into three regions—southern, central, and northern—based on geographic location, and the sampling was carried out in three stages:

Stage 1 involved city sampling: simple random sampling was used in each of the three regions—southern, central, and northern—to select one city representative of medical education in that region. Ultimately, Wuhu (south), Hefei (central), and Bengbu (north) were selected as the survey cities, ensuring both randomness and geographic coverage in city selection.

Stage Two involved sampling survey institutions: Within each selected city, the sampling frame consisted of medical universities and their directly affiliated hospitals offering postgraduate medical programs. Representative institutions were randomly selected as survey sites based on the scale of postgraduate training, hospital grade, and disciplinary composition. All selected institutions agreed to participate in this study, and a total of five university-affiliated hospitals were ultimately included in the survey.

The third stage involved sampling the study participants: Using the Probability Proportional to Size (PPS) sampling principle, questionnaire distribution quotas were allocated proportionally to each institution based on the total number of enrolled medical graduate students at each survey site. A total of 2,599 questionnaires were distributed. Due to differences in the scale of graduate student training across institutions, there were some variations in sample size distribution among the institutions. These variations corresponded to the actual training scales of each institution, were consistent with the logic of the sampling design, and did not compromise the overall representativeness of the sample.

The Ethics Committee of the First Affiliated Hospital of Anhui Medical University approved the ethics application for this study (PJ 2025-03-68). Study participants were required to possess normal language and cognitive abilities, be at least 18 years of age, and voluntarily consent to participate. The survey was conducted *via* an online questionnaire platform, ensuring the anonymity and confidentiality of data collection throughout the process. Prior to the formal survey, all participants signed a written informed consent form. A total of 2,599 questionnaires were collected for this survey. After excluding invalid questionnaires with incomplete responses or logical inconsistencies, 2,587 valid questionnaires were ultimately obtained, resulting in an individual-level response rate of 99.5%. The sample size is adequate based on the prevalence rates among graduate students reported in previous studies (Figure 1).

2.2. Measurement

2.2.1. Measurement of Anxiety symptoms

The Zung Self-Rating Anxiety Scale (SAS) (*24*) was used to evaluate anxiety symptoms in medical graduate students. This scale is widely used for screening anxiety symptoms rather than for clinical diagnosis. Every item is evaluated on a 4-point Likert scale, with scores from 1 (never or rarely) to 4 (most of the time). Anxiety levels are categorized as none (25–49 points), mild (50–59 points), moderate (60–69 points), and severe (70–100 points). In the study sample, the SAS scale showed good internal consistency, indicated by a Cronbach's α of 0.935.

2.2.2. Measurement of social capital

Referring to previous studies on social capital

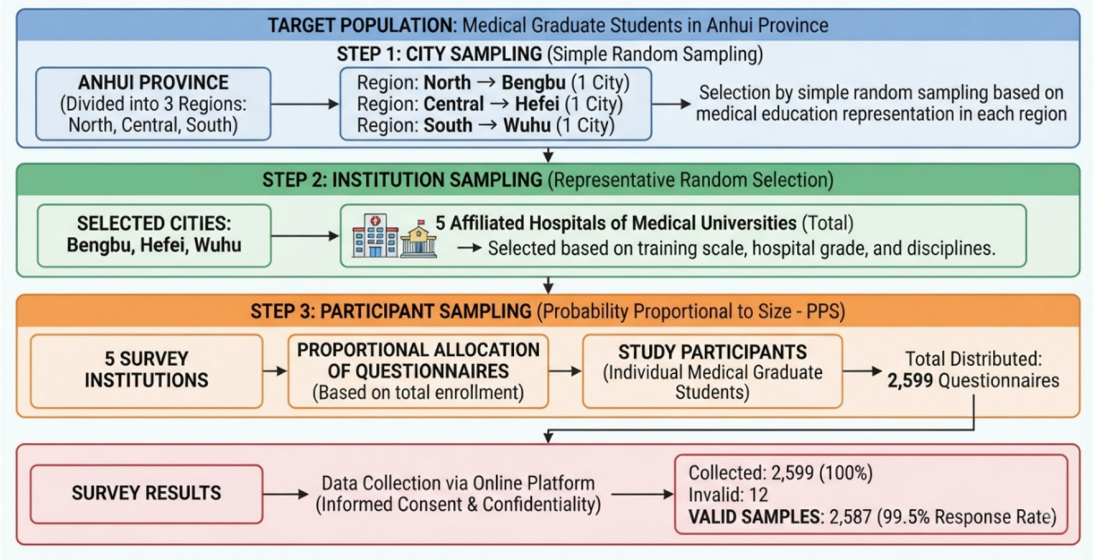


Figure 1. Data acquisition flowchart.

measurement methods (*25-27*), this study selected and adapted some items based on the characteristics of medical graduate students to form a set of social capital measurement tools suitable for medical graduate students. The scale includes six aspects: social participation, social support, social connection, trust, sense of belonging, and reciprocity, with a total of 24 items. Each item is evaluated using a five-point Likert scale, with choices ranging from 1 for "never" to 5 for "very often". Elevated scores reflect increased levels of social capital in the dimension or overall. We used the median method to dichotomize scores for each dimension: social participation (high ≥ 8), social support (high ≥ 12), social connection (high ≥ 12), trust (high ≥ 21), sense of belonging (high ≥ 19), and reciprocity (high ≥ 12). The statistical analysis revealed that the scale's overall Cronbach's α was 0.936, suggesting high reliability of the tool. Discriminant validity among the six dimensions was evaluated using the heterotrait–monotrait ratio (HTMT); all values ranged from 0.492 to 0.728 and were below the prespecified threshold of 0.85. The multicollinearity analysis did not reveal any multicollinearity (Supplementary Table S1, *https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*).

2.2.3. Measurement of Other Variables

The variables also encompass age (21–25, 26–30, and ≥ 31), residence (urban, rural), gender (male, female), degree (master's students, doctoral students), grade (1, 2, 3), income level (< 15,000, 15,000-18,000, > 18,000), frequency of communication with family and tutors (once every six months, once a month, once a week and more), exercise (never, 1-2 times per week, 3 or more times per week), smoking and drinking (never, former, current), chronic diseases (yes, no), *etc*.

2.3. Statistical analysis

The sample's general characteristics were analyzed using descriptive statistics. Mean ± standard deviation (x ± s) was used to express continuous variables, whereas categorical variables were shown as frequency and percentage. Chi-square tests (χ^2) were employed to examine variations in social capital scores and demographic variables across different anxiety levels, and ANOVA was used to determine if social capital varied across different dimensions among various anxiety levels. SAS was utilized as observed variables for latent profile analysis using Mplus version 8.3. The selection of the optimal model was guided by several indicators. The Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample size-adjusted BIC (aBIC) were observed to decrease progressively with an increasing number of categories, indicating that lower values correspond to better model fit. The Lo-Mendell-Rubin likelihood ratio test (LMR) and the Bootstrapped Likelihood Ratio Test (BLRT) yielded p-values of less than 0.05, suggesting that a model with k categories is more appropriate than one with k-1 categories. Entropy was used as an accuracy indicator for evaluating category classification, with values of ≥ 0.8 indicating classification accuracy exceeding 90%. Beyond these statistical indicators, practical significance and interpretability were also taken into consideration. Covariates were related to latent class membership using the three-step procedure, which accounts for uncertainty in class assignment. A large number of random starting values were used to reduce the likelihood of local maxima, and the best log-likelihood value was replicated. Based on the above, we constructed a multinomial

logistic regression model to investigate the link between different elements of social capital and varying degrees of anxiety symptoms.

To test the robustness of the results, a two-level random-intercept model was used as an exploratory sensitivity analysis to account for clustering of participants within institutions. The analysis employed a multilevel data structure comprising 2,587 individuals (Level 1) nested within 5 schools (Level 2). Multilevel linear regression analysis was performed using continuous SAS scores as the dependent variable. The model was estimated *via* restricted maximum likelihood (REML). The intraclass correlation coefficient (ICC) was calculated as 0.04, meaning that only a minor proportion of the total variance in anxiety severity was explained by between-institution differences. $P < 0.05$ is regarded as statistically significant. We utilized IBM SPSS Statistics 27.0 and Mplus 8.3 for our data analysis.

3. Results

3.1. Demographic characteristics

The demographic details of the study, sorted by gender, are outlined in Table 1 ($N = 2,587$), comprising 1,138 males (44%) and 1,449 females (56%). Most of the respondents were aged between 21 and 30 (92%). The proportion of female students from rural areas (59.6%) was slightly higher than that of male students (56.6%). In terms of degree and grade, the proportion of female master's students was slightly higher (88.2%) than that of male students (87.0%), and about half of the population was concentrated in the first grade, accounting for 52.5% and 46.0% of males and females, respectively. The majority, 59.5%, of individuals have an income that is under 15,000 yuan. Females are more likely to communicate with their families at least once a week (87.5% *vs*. 80.8%), while males are more likely to communicate with their tutors at least once a week (69.3% *vs*. 67.6%). In terms of exercise, about a quarter (23.4%) of male students exercise 3 or more times per week, while only 10.7% of female students do so. The proportion of female students who never smoke (99.3%) and never drink (93.7%) is significantly higher than that of male students, at 89.3% and 64.9% respectively. Only 5.5% of participants suffer from chronic diseases. Anxiety symptoms are present in 30.5% of medical graduate students, affecting 32.0% of males and 29.3% of females.

3.2. Latent profile analyses

This study used LPA to identify latent anxiety severity classes among medical graduate students. Based on statistical fit indices, including AIC, BIC, aBIC, entropy, LMR, and BLRT, models with 1 to 6 features were evaluated, as shown in Supplementary Table S2 (*https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*). The latent profile model of anxiety symptoms is depicted in Figure 2, illustrating the structure and class probabilities of the three identified subgroups. The results showed that the scores for items across the three latent categories exhibited an overall parallel upward trend; the ranking of scores among items was consistent with no obvious overlap.

Notably, the six-profile model's AIC, BIC, and aBIC values gradually declined, with the four-profile model attaining the peak Entropy value of 0.983. However, the LMR p-values for the models with four and five profiles exceeded 0.05, and the six-profile model had too few participants in certain profile proportions, so these three were excluded. Despite the 3-profile model having a slightly lower Entropy than the 2-profile model, it still maintained a high value of 0.954, suggesting that the three-category division was distinct. In addition, the values for AIC, BIC, and aBIC were significantly reduced relative to the 2-profile model, indicating better model fit. Additionally, there are no extremely small categories, and the 51%, 18%, and 31% proportions are very acceptable structures in this study. Therefore, the 3-profile model was ultimately selected. Supplementary Table S3 (*https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*) shows that each respondent attributed high probabilities to their most likely trait (0.986 for Profile 1, 0.940 for Profile 2, and 0.991 for Profile 3), which demonstrates the reliability of the categorization.

3.3. Inter-profile characteristic differences

The research revealed that 50.6% of medical graduate students had low anxiety symptoms, 18.6% had moderate symptoms, and 30.8% had high symptoms. As shown in the chi-square test in Supplementary Table S4 (*https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*), age, residence, gender, Degree, grade, income level, frequency of communication with family and tutors, exercise, smoking and drinking, chronic diseases, and various aspects of social capital were all significantly correlated with different levels of anxiety symptoms, $P < 0.05$.

The box plots in Figure 3 illustrate the score distributions across the various dimensions of social capital for different anxiety symptoms level groups, visually showing that the low anxiety symptoms group generally scored higher across all dimensions of social capital compared to the moderate or high anxiety symptoms groups. Analysis of variance with social capital as the dependent variable revealed statistically significant differences between low, moderate, and high anxiety levels across all dimensions of social capital, with $P < 0.001$. This shows a strong link between latent anxiety severity classes and every aspect of social capital, see Supplementary Table S5 (*https://www.*

Table 1. Basic characteristics of the study population

Variables	Male [*N* (%)]	Female [*N* (%)]	Total [*N* (%)]
Age(years)			
21-25	475 (41.7)	645 (44.5)	1120 (43.3)
26-30	554 (48.7)	707 (48.8)	1261 (48.7)
≥ 31	109 (9.6)	97 (6.7)	206 (8.0)
Residence			
Urban	494 (43.4)	585 (40.4)	1079 (41.7)
Rural	644 (56.6)	864 (59.6)	1508 (58.3)
Degree			
Master's students	990 (87.0)	1278 (88.2)	2268 (87.7)
Doctoral students	148 (13.0)	171 (11.8)	319 (12.3)
Grade			
1	598 (52.5)	667 (46.0)	1265 (48.9)
2	271 (23.8)	423 (29.2)	694 (26.8)
3	269 (23.6)	359 (24.8)	628 (24.3)
Income level (RMB)			
<15,000	681 (59.8)	858 (59.2)	1539 (59.5)
15,000-18,000	245 (21.5)	323 (22.3)	568 (22.0)
>18,000	212 (18.6)	268 (18.5)	480 (18.6)
Frequency of communication with family			
Once every six months	43 (3.8)	18 (1.2)	61 (2.4)
Once a month	176 (15.5)	163 (11.2)	339 (13.1)
Once a week and more	919 (80.8)	1268 (87.5)	2187 (84.5)
Frequency of communication with tutors			
Once every six months	37 (3.3)	36 (2.5)	73 (2.8)
Once a month	312 (27.4)	433 (29.9)	745 (28.8)
Once a week and more	789 (69.3)	980 (67.6)	1769 (68.4)
Exercise			
Never	228 (20.0)	440 (30.4)	668 (25.8)
1-2 times per week	644 (56.6)	854 (58.9)	1498 (57.9)
3 or more times per week	266 (23.4)	155 (10.7)	421 (16.3)
Smoking			
Never	1016 (89.3)	1439 (99.3)	2455 (94.9)
Former	39 (3.4)	2 (0.1)	41 (1.6)
Current	83 (7.3)	8 (0.6)	91 (3.5)
Drinking			
Never	738 (64.9)	1358 (93.7)	2096 (81.0)
Former	108 (9.5)	23 (1.6)	131 (5.1)
Current	292 (25.7)	68 (4.7)	360 (13.9)
Chronic disease			
No	1068 (93.8)	1376 (95.0)	2444 (94.5)
Yes	70 (6.2)	73 (5.0)	143 (5.5)
Social participation			
Low	460 (40.4)	553 (38.2)	1013 (39.2)
High	678 (59.6)	896 (61.8)	1574 (60.8)
Social support			
Low	332 (29.2)	375 (25.9)	707 (27.3)
High	806 (70.8)	1074 (74.1)	1880 (72.7)
Social connection			
Low	435 (38.2)	540 (37.3)	975 (37.7)
High	703 (61.8)	909 (62.7)	1612 (62.3)
Trust			
Low	485 (42.6)	651 (44.9)	1136 (43.9)
High	653 (57.4)	798 (55.1)	1451 (56.1)
Sense of belonging			
Low	485 (42.6)	651 (44.9)	1136 (43.9)
High	653 (57.4)	798 (55.1)	1451 (56.1)
Reciprocity			
Low	484 (42.5)	621 (42.9)	1105 (42.7)
High	654 (57.5)	828 (57.1)	1482 (57.3)
Anxiety symptoms			
No	774 (68.0)	1025 (70.7)	1799 (69.5)
Yes	364 (32.0)	424 (29.3)	788 (30.5)

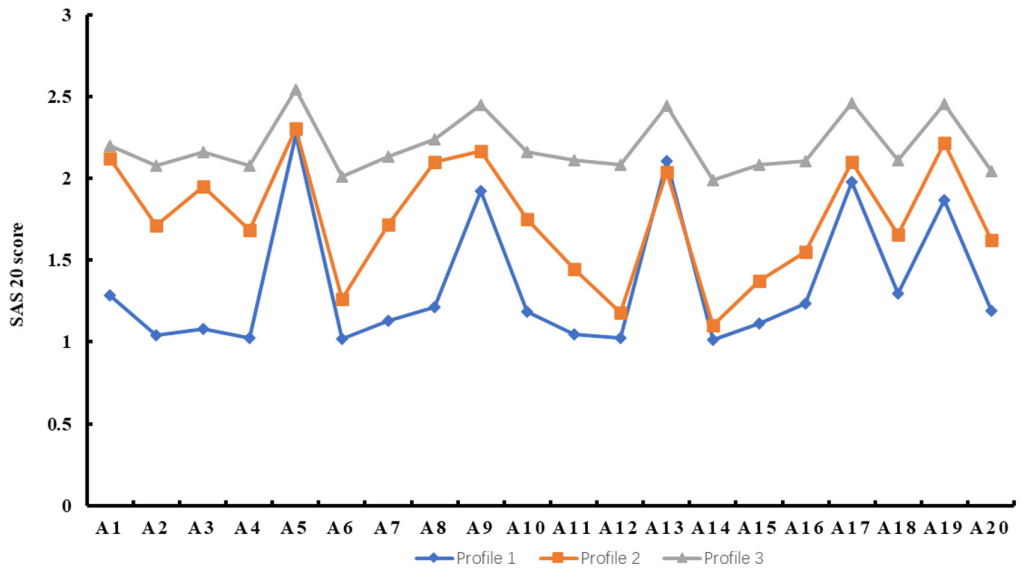


Figure 2. Latent profile model of anxiety symptoms.

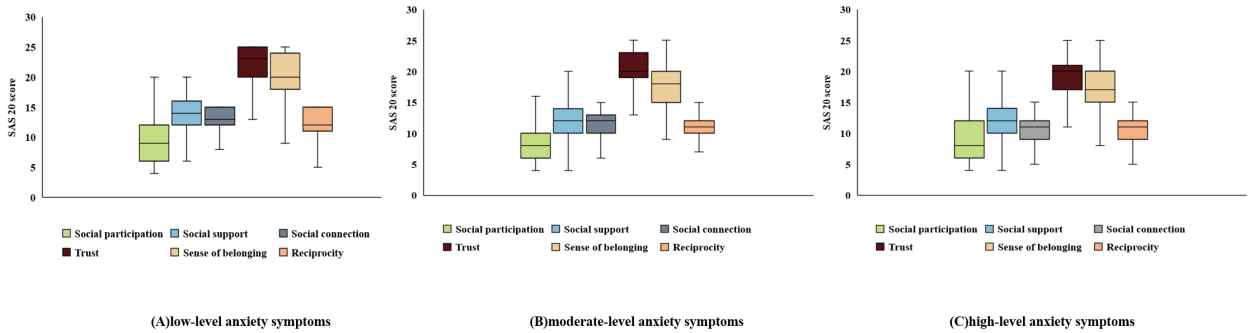


Figure 3. The average social capital score distribution comparison of different categories of anxiety symptoms.

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3.4. Analysis of latent anxiety severity profiles using multinomial logistic regression

Table 2 shows the factors associated with latent anxiety severity-profile membership after adjustment for relevant covariates. Using the low-anxiety profile as the reference, high social support (OR = 0.720; 95% CI: 0.545-0.951), high social connection (OR = 0.643; 95% CI: 0.487-0.848), and high trust (OR = 0.561; 95% CI: 0.432-0.729) were associated with lower odds of membership in the moderate-anxiety profile. For the high-anxiety profile versus the low-anxiety profile, high social participation was associated with greater odds of membership (OR = 1.302; 95% CI: 1.040-1.629), whereas high social support (OR = 0.715; 95% CI: 0.557-0.919), high social connection (OR = 0.506; 95% CI: 0.394-0.650), and high trust (OR = 0.324; 95% CI: 0.257-0.409) were associated with lower odds. When the moderate-anxiety profile was used as the reference, high social participation was associated with greater odds of membership in the high-anxiety profile (OR = 1.340; 95% CI: 1.042-1.725), whereas high trust was associated with lower odds (OR = 0.627; 95% CI: 0.476-0.825). Reciprocity was not significantly associated with profile membership.

In the sensitivity analysis (Supplementary Table S6, *https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*), this study conducted a multiple linear regression using the SAS total score as a continuous outcome. After adjusting for relevant factors, the results showed the same direction of effect as the main analysis. Specifically, it was once again confirmed that higher levels of social participation were associated with higher SAS scores (B = 0.044, 95% CI: 0.008, 0.080). Compared with the reference group, medical graduate students' social support (B = −0.070, 95% CI: −0.108, −0.033), social connection (B = −0.124, 95% CI: −0.167, −0.082), trust (B = −0.246, 95% CI: −0.290, −0.209), and sense of belonging (B = −0.091, 95% CI: −0.135, −0.047) were associated with lower SAS scores. No statistically significant correlation was found between reciprocity and anxiety level. In the multiple linear regression model incorporating the six dimensions of social capital as independent variables,

Table 2. Multinomial logistic regression of anxiety symptoms profiles

Variables	Low (*ref*) *vs.* Moderate		Low (*ref*) *vs.* High		Moderate (*ref*) *vs.* High	
	OR (95%CI)	*P*	OR (95%CI)	*P*	OR (95%CI)	*P*
Age(years)						
21-25 (reference)						
26-30	1.040 (0.789-1.371)	0.780	0.756 (0.588-0.972)	0.029	0.725 (0.535-0.982)	0.038
≥ 31	1.149 (0.717-1.840)	0.564	0.695 (0.444-1.089)	0.112	0.685 (0.402-1.167)	0.164
Residence						
Urban (reference)						
Rural	0.827 (0.657-1.042)	0.106	1.149 (0.933-1.415)	0.190	1.340 (1.051-1.708)	0.018
Gender						
Male (reference)						
Female	1.397 (1.075-1.816)	0.013	0.895 (0.717-1.118)	0.330	0.662 (0.507-0.864)	0.002
Degree						
Master's students (reference)						
Doctoral students	0.845 (0.578-1.237)	0.387	0.620 (0.426-0.904)	0.013	0.808 (0.515-1.268)	0.354
Grade						
1 (reference)						
2	0.877 (0.663-1.161)	0.360	0.864 (0.670-1.115)	0.260	1.030 (0.757-1.402)	0.850
3	1.020 (0.747-1.395)	0.899	1.375 (1.031-1.834)	0.030	1.205 (0.859-1.690)	0.280
Income level(RMB)						
<15,000 (reference)						
15,000-18,000	0.843 (0.636-1.117)	0.234	0.598 (0.463-0.771)	<0.001	0.761 (0.563-1.030)	0.077
>18,000	0.888 (0.655-1.205)	0.447	0.586 (0.438-0.784)	<0.001	0.693 (0.495-0.970)	0.032
Frequency of communication with family						
Once every six months (reference)						
Once a month	1.414 (0.565-3.539)	0.459	0.734 (0.357-1.509)	0.400	0.499 (0.220-1.132)	0.096
Once a week and more	1.120 (0.462-2.717)	0.802	0.658 (0.331-1.309)	0.233	0.523 (0.237-1.154)	0.109
Frequency of communication with tutors						
Once every six months (reference)						
Once a month	1.167 (0.593-2.294)	0.655	1.266 (0.657-2.437)	0.481	1.239 (0.649-2.368)	0.516
Once a week and more	0.968 (0.496-1.887)	0.923	1.307 (0.686-2.489)	0.415	1.539 (0.813-2.914)	0.185
Exercise						
Never (reference)						
1-2 times per week	0.772 (0.588-1.012)	0.061	1.003 (0.779-1.293)	0.980	1.262 (0.956-1.665)	0.100
3 or more times per week	0.573 (0.389-0.844)	0.005	0.701 (0.496-0.991)	0.044	1.251 (0.823-1.900)	0.295
Smoking						
Never (reference)						
Former	1.348 (0.538-3.380)	0.524	1.684 (0.744-3.811)	0.211	1.081 (0.421-2.773)	0.871
Current	1.688 (0.902-3.159)	0.102	1.127 (0.622-2.040)	0.693	0.984 (0.532-1.822)	0.960
Drinking						
Never (reference)						
Former	1.516 (0.884-2.598)	0.130	1.368 (0.831-2.251)	0.218	0.801 (0.453-1.414)	0.444
Current	1.447 (1.011-2.069)	0.043	1.304 (0.943-1.803)	0.108	0.852 (0.591-1.230)	0.393
Chronic disease						
No (reference)						
Yes	1.595 (0.978-2.601)	0.061	1.420 (0.895-2.255)	0.137	0.969 (0.611-1.535)	0.893
Social participation						
Low (reference)						
High	1.001 (0.782-1.281)	0.996	1.302 (1.040-1.629)	0.021	1.340 (1.042-1.725)	0.023
Social support						
Low (reference)						
High	0.720 (0.545-0.951)	0.021	0.715 (0.557-0.919)	0.009	1.115 (0.847-1.466)	0.438
Social connection						
Low (reference)						
High	0.643 (0.487-0.848)	0.002	0.506 (0.394-0.650)	< 0.001	0.798 (0.598-1.066)	0.127
Trust						
Low (reference)						
High	0.561(0.432-0.729)	< 0.001	0.324 (0.257-0.409)	< 0.001	0.627 (0.476-0.825)	< 0.001
Sense of belonging						
Low (reference)						
High	0.821(0.620-1.088)	0.170	0.760 (0.582-0.992)	0.043	0.914 (0.673-1.241)	0.563
Reciprocity						
Low (reference)						
High	0.766(0.585-1.002)	0.052	0.885 (0.685-1.144)	0.353	0.972 (0.731-1.294)	0.848

represented by their original continuous scores, and SAS scores as the dependent variable, the findings aligned with those obtained from the main analysis (Supplementary Table S7, *https://www.biosciencetrends.com/action/getSupplementalData.php?ID=318*).

4. Discussion

This study examined latent anxiety severity profiles among medical graduate students and their associations with multiple dimensions of social capital. Medical graduate students in Anhui Province, China, showed a substantial burden of anxiety symptoms, with three empirically derived severity profiles: low, moderate, and high. Trust, social connection, social support, and sense of belonging were generally inversely associated with anxiety severity, whereas higher social participation was associated with greater anxiety severity. Reciprocity showed no independent association in the adjusted analyses.

Our findings indicate that 30.5% of medical graduate students experienced anxiety symptoms, which is higher than the 18.0% average prevalence reported among Chinese medical students (*28*) and higher than the rates of 14.0% (*4*) and 22.2% (*29*) reported in two previous studies of Chinese medical postgraduates. However, the observed prevalence was slightly lower than the global estimate of 33.8% for medical students (*12*). These differences may reflect variation in academic, research, and career-development pressures, as well as differences in cultural context, geographic sampling, assessment instruments, and study design.

Social support was inversely associated with anxiety severity, consistent with prior evidence (*29-31*). Previous studies suggest that social support may help medical graduate students manage academic and daily-life challenges (*29*). Among nursing graduate students, social support has also been reported to mediate the association between work stress and anxiety symptoms during intensive clinical internships (*30*). Emotional reassurance, practical assistance, and access to coping resources may therefore be plausible pathways linking stronger perceived support with better mental health (*32*).

Lower trust was associated with greater anxiety severity in our sample. Consistent with this finding, a Swedish cohort study reported inverse associations of trust with anxiety and depressive symptoms (*33*). One possible explanation is that trusting relationships may facilitate expression of psychological needs and help-seeking (*34*). In medical graduate training, trust in family members, peers, and supervisors may also reduce social uncertainty and improve the quality of communication in research and clinical settings. These processes could lessen perceived threats related to academic evaluation and peer competition. This pattern is consistent with the stress-buffering framework, in which trust may function as an important cognitive social-capital resource.

Social connection also showed a consistent inverse association with anxiety severity. Medical graduate students who maintain close ties with family members, supervisors, and peers may have greater access to empathy, practical support, and opportunities to discuss concerns. Previous studies similarly suggest that stronger social connection and group identity are associated with lower anxiety and stress levels among young people (*35*). In high-pressure medical training environments, supportive interpersonal connections may therefore represent an important psychological resource (*36,37*).

Sense of belonging was inversely associated with anxiety severity, particularly when the high-anxiety and low-anxiety profiles were compared. Prior research has linked stronger university belonging with lower academic anxiety (*38*). Feeling accepted, recognized, and supported within a social setting is an important component of social connectedness (*39,40*), whereas weak belonging may accompany difficulties in adaptation and greater psychological stress.

A notable finding was that higher social participation was associated with greater anxiety severity, in contrast to studies in which social participation has generally been linked to better mental health outcomes (*41-43*). Other evidence, however, suggests that the effects of participation can be context-dependent (*44*), and medical-student volunteering in post-disaster settings has also been associated with additional psychological strain (*45*). Several explanations are plausible. First, frequent participation may consume time and energy that would otherwise be available for research, clinical work, rest, and sleep. Second, some forms of participation may be obligatory or performance-oriented, being tied to academic evaluation, organizational responsibilities, or supervisor expectations rather than voluntary social engagement. Third, reverse selection is possible: students with higher anxiety may seek more social interaction or may be assigned more group-related tasks. Accordingly, the positive association observed here should not be interpreted as evidence that social participation causes anxiety. It may reflect excessive or obligatory participation, unmeasured role strain, reverse selection, or other residual confounding.

Beyond social capital, several demographic and lifestyle variables were associated with anxiety severity, including sex, income level, physical activity, and alcohol consumption. Female students and students with lower income levels showed greater anxiety severity in some comparisons, broadly consistent with previous reports (*46-48*). Such differences may reflect a combination of biological susceptibility, gendered social expectations, differential exposure to academic or caregiving burdens, and differences in symptom recognition and reporting (*49-51*). Lower income may also increase financial strain and concerns about debt (*52*). Regular physical activity was associated with lower anxiety severity, particularly among students exercising three or more times per

week, in line with previous studies (*53*). Potential pathways include effects on sleep, stress regulation, and neurobiological systems involved in mood and anxiety (*54*). Alcohol use, by contrast, was associated with greater anxiety vulnerability in some analyses, consistent with the possibility that alcohol-based coping may fail to address underlying stressors and may worsen longer-term coping capacity (*29,55,56*).

Several limitations should be considered. First, the cross-sectional design does not establish temporal or causal relationships between social capital and anxiety symptoms; anxiety may itself influence perceptions of social capital, and reverse causality is possible. Second, the study relied primarily on self-reported questionnaires and may therefore be affected by recall or social-desirability bias. Third, participants were medical postgraduates from Anhui Province, and only a small number of institutions were included, which limits generalizability and prevents comprehensive assessment of institution-level differences. Fourth, potentially relevant psychological factors, such as personality traits and coping strategies, were not measured. Fifth, the latent profiles primarily represented severity strata rather than clinically distinct symptom patterns. Finally, the social-participation measure did not distinguish voluntary and supportive participation from mandatory or performance-oriented participation. Future longitudinal and multicenter studies should address these limitations and further clarify the contextual mechanisms linking different dimensions of social capital with anxiety severity.

5. Conclusions

Social capital was associated with anxiety severity among medical graduate students, but the direction of association differed across dimensions. Social support, social connection, trust, and sense of belonging showed inverse associations with anxiety symptoms, whereas higher social participation was associated with greater anxiety severity. These findings suggest that social capital should not be treated as a uniformly beneficial resource and that its different dimensions may operate differently across educational contexts. When developing mental health initiatives, universities may consider distinguishing supportive social activities from mandatory or performance-oriented group activities and placing greater emphasis on the quality of social support rather than participation quantity alone. Institutions may also consider strengthening psychological safety in supervisor-student interactions, improving access to confidential mental health support, and paying attention to structural pressures and disparities in social resources among lower-income students. Further longitudinal and intervention research is needed to define the boundaries and mechanisms of these associations and to determine whether modifying specific dimensions of social capital can improve mental health outcomes.

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[§]These authors contributed equally to this work.
*Address correspondence to:
Ren Chen, The Fourth Affiliated Hospital of Anhui Medical University, Hefei 231200, Anhui, China.
E-mail: chenren@ahmu.edu.cn

Xiaoli Wu, Hospital Director's Office, The First Affiliated Hospital of Anhui Medical University, Hefei 230032, Anhui, China.
E-mail: ayfywuxiaoli@163.com

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