

Association between Overall Health, Social Anxiety and Sleep Quality Among College Students

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Abstract: *Objective:* To construct a factor model of college students' overall health from the dimensions of online and offline social anxiety, explore the impact mechanism of social anxiety on college students' physical health, mental health, and social adaptability, and test the mediating effect of sleep quality. *Methods:* A questionnaire survey was conducted among 1,018 college students. *t*-test and analysis of variance were used to examine the differences in demographic characteristics on various variables, and the Bootstrap method was used to test the mediating effect of sleep quality. *Results:* College students' online social anxiety ($M = 18.42$) was higher than offline ($M = 16.75$). Sleep quality is a key mediator of the impact of social anxiety on health: online anxiety fully mediates mental health and social adaptability through sleep quality, and partially mediates physical health; offline anxiety partially mediates other health indicators in addition to fully mediating mental health. *Conclusion:* It is recommended to intervene through self-regulation, family emotional communication, sleep health education, and psychological support system construction to alleviate college students' social anxiety, improve sleep quality, and enhance the overall health of this group.

Keywords: Social anxiety; Sleep quality; Mental health; Physiological health; Social adaptability

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1. Introduction

As the scale of higher education continues to expand, the total number of college students has shown an increasing trend year by year, and the overall health issues of college students have become the focus of the "Healthy China" strategy. Social anxiety is prevalent among college students, and social anxiety caused by interpersonal relationships has become a common psychological problem ^[1]. A survey of colleges and universities across the country showed that 87.8% of college students have varying degrees of social anxiety ^[2]. At the same time, the sleep problems of college students also deserve attention. Related reports show that nearly 80% of college students fall asleep later than 23:30, and their sleep quality is generally poor ^[3]. It is worth noting that there is an interactive relationship between sleep quality and mental health ^[4]. Therefore, it can be inferred that social anxiety can affect the overall health of college students through sleep quality. In the context of high penetration of social media, social anxiety may be further exacerbated through online social interaction, thereby impairing sleep and affecting overall health. Based on this, this study explores the impact and mechanism of social anxiety on college students' sleep quality and overall health from two dimensions: online and offline, and provides a reference for alleviating college students' social anxiety, improving sleep quality, and improving health.

2. Objects and methods

2.1. Object

The research uses a combination of online and offline methods to select survey objects. The offline survey adopted quota sampling and encounter sampling; the online survey was initially launched through multiple channels such as professional class groups of each grade and college student club platforms, and “snowball sampling” was used to encourage students to forward and spread. A total of 1,018 questionnaires were collected. After eliminating abnormal data, 991 valid questionnaires were finally included, with an effective recovery rate of 97.3%. Among them, 469 are boys (47.3%), and 522 are girls (52.7%).

2.2. Method

Except for the sleep quality scale, all scales in this study adopt a five-point Likert scale (1 = “completely inconsistent” to 5 = “completely consistent”). The Cronbach’s Alpha coefficient of the scale in the study is 0.728 to 0.906, with good internal consistency.

2.2.1. Basic demographic information

Including gender, age, education, major, urban and rural background, whether you are an only child, etc.

2.2.2. Offline social anxiety scale

This study measured offline social anxiety using the Social Phobia Scale (SPS) and Social Interaction Anxiety Scale (SIAS) adapted from Mattick et al., and combined with the social situation and psychological characteristics of college students, selected 5 representative items^[5]. The higher the score, the more serious the offline social anxiety of the survey subjects.

2.2.3. Online social anxiety scale

Reference was made to the Social Anxiety Scale for Social Media Users (SAS--SMU), which is specifically designed to assess an individual’s anxiety experience in a social media environment^[6]. Based on the characteristics of college students who frequently use social media and pay attention to their online image, 6 more representative items were selected. The higher the score, the more serious the online social anxiety situation is.

2.2.4. Sleep quality

Simplified revision based on the Chinese version of the Pittsburgh Sleep Quality Index (PSQI) revised by Liu Xianchen et al.^[7]. In order to improve the efficiency of the survey and optimize the operability of the questionnaire, this study simplified the original scale, integrating the original complex sub-dimensional scoring into a direct score of 10 items. The study assigned the first question option A->E a value of 1 to 5 points; the third question option A->E assigned a value of 4 to 0 points (reverse); the fourth question included 4 sub-items, all with 0 = “none”, 1 = “<1 time/week”, 2 = “1–2 times/week”, 3 = “≥ 3 times/week” are coded; the remaining items are assigned 0 to 3 points from A->D respectively. The higher the score, the worse the sleep quality.

2.2.5. Mental health scale

Referring to the General Health Questionnaire 20-item (GHQ-20)^[8]. This study selected 5 items to form a simplified version of the scale based on the psychological characteristics of college students. The higher the score, the better the mental health status.

2.2.6. Physical health scale

Referring to the physiological health dimension scale in the Multidimensional Health Assessment Tool for College Students, there are 5 items in total, which can comprehensively reflect an individual's recent physiological state^[9]. The higher the total score of the scale, the more prominent the physical health problems perceived by the subject, that is, the worse the health status.

2.2.7. Social adaptability scale

This part is designed based on Professor Zheng Richang's "Social Adaptability Diagnostic Scale"^[10]. Based on the theme of this study, 5 representative items are selected. The higher the score, the stronger the social adaptability.

2.3. Statistical analysis

After data entry and verification, SPSS 26.0 and SmartPLS 4.0 software were used for statistical analysis. In SPSS 26.0 software, descriptive analysis was performed on each variable, and comparisons between groups were analyzed using t-test and ANOVA. The correlation between variables was analyzed using Pearson correlation, using Model 4 in the SPSS macro program Process, and combined with the Bootstrap method to test the mediating effect. Partial least squares structural equation modeling (PLS-SEM) was used in SmartPLS 4.0 software to analyze the impact of college students' social anxiety and sleep quality on their overall health.

3. Results

3.1. Survey respondents' scores on each scale

The descriptive statistical results of core variables show that more than 50% of college students have moderate or above anxiety levels in online and offline social interactions, and the level of online social anxiety is higher than offline; in terms of sleep quality, the overall level is at an average level, with 36.13% of students having obvious sleep problems; in terms of health, 18.16% of students show mental health risks, and the overall condition of physical health and social adaptability is good.

3.2. Analysis of differences between survey groups

The results of the independent-samples t-test showed: (1) There is a significant gender difference in offline social anxiety ($p < 0.01$). Female college students have slightly higher offline social anxiety than male college students; (2) Only children have higher scores in mental health and social adaptability than non-only children ($p < 0.05$), and the difference between the groups is statistically significant.

The results of the ANOVA show that offline social anxiety has significant differences in majors, with science students having the highest score; online social anxiety has significant differences in age and major, with 23–25 years old being the highest, and science students having higher scores; mental health has significant differences in age, major, and urban and rural background: those under 18 years old, those with literary and artistic backgrounds, and rural backgrounds have the worst; physical health There are significant differences in age and major: 23–25 year olds, science students have poorer physical health; social adaptability has significant differences in age, education, major, and urban and rural background: those under 18 years old, those with junior college degrees, arts and sports, and rural backgrounds are the worst; sleep quality has significant differences in age and major: 23–25 years old, science students are the worst.

3.3. The impact mechanism of online and offline social anxiety and sleep quality on the overall health of college students

The mediating effect test results show that in the path "online social anxiety → offline social anxiety → sleep quality", the direct effect value of online social anxiety on sleep quality is 0.126 (95% CI = 0.084–0.168), and the upper and lower

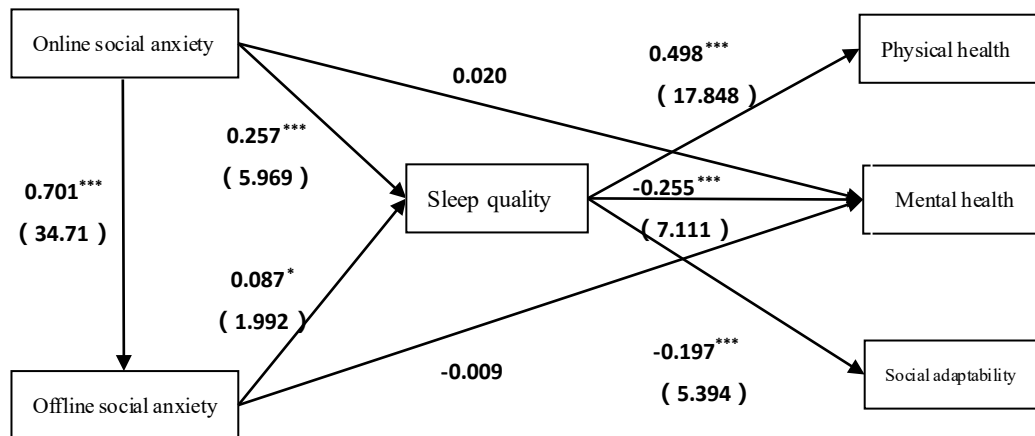
limits of the confidence interval do not include 0. ; The mediation effect value is 0.028 (95% CI = -0.002–0.058), and the upper and lower limits of the confidence interval include 0, indicating that online social anxiety has a direct effect on sleep quality, but the mediating effect of offline social anxiety on sleep quality is not significant. In the same way, sleep quality fully mediates the path “online social anxiety → sleep quality → mental health”, “online social anxiety → sleep quality → social adaptability”, and “offline social anxiety → sleep quality → mental health” It plays a partial mediating effect in “online social anxiety → sleep quality → physical health”, “offline social anxiety → sleep quality → physical health”, and “offline social anxiety → sleep quality → social adaptability”. See **Table 1** for details.

Table 1. Bootstrap test table

	Path	Effect	Standard error (SE)	Confidence interval 95%		Relative effect	p
				LLCI	ULCI		
Total effect	Online social anxiety → offline social anxiety → sleep quality	0.154	0.015	0.124	0.183		0.000
Direct effect		0.126	0.212	0.084	0.168	81.95%	0.000
Mediating effect		0.028	0.015	-0.002	0.058	18.05%	
Total effect	Online social anxiety → sleep quality → mental health	-0.058	0.028	-0.114	-0.003		0.0376
Direct effect		0.013	0.029	-0.043	0.069	15.48%	0.6581
Mediating effect		-0.071	0.01	-0.093	-0.052	-84.52%	
Total effect	Online social anxiety → sleep quality → physical health	0.449	0.03	0.391	0.508		0.000
Direct effect		0.331	0.029	0.274	0.387	73.58%	0.000
Mediating effect		0.119	0.015	0.091	0.15	26.42%	
Total effect	Online social anxiety → sleep quality → social adaptability	-0.092	0.025	-0.141	-0.043		0.0003
Direct effect		-0.049	0.026	-0.1	0.002	-53.26%	0.06
Mediating effect		-0.043	0.009	-0.061	-0.026	-46.74%	
Total effect	Offline social anxiety → sleep quality → physical health	0.332	0.033	0.268	0.396		0.000
Direct effect		0.217	0.031	0.16	0.277	65.31%	0.000
Mediating effect		0.115	0.016	0.085	0.147	34.69%	
Total effect	Offline social anxiety → sleep quality → mental health	-0.056	0.029	-0.113	0.001		0.054
Direct effect		0.004	0.029	-0.053	0.062	6.15%	0.8807
Mediating effect		-0.061	0.01	-0.08	-0.042	-93.85%	
Total effect	Offline social anxiety → sleep quality → social adaptability	-0.117	0.026	-0.168	-0.066		0.000
Direct effect		-0.082	0.026	-0.134	-0.03	-70.09%	0.0021
Mediating effect		-0.036	0.008	-0.052	-0.021	-29.91%	

3.4. Structural equation model path verification of the impact of social anxiety and sleep quality on college students' overall health

This study uses SmartPLS 4.0 software to test the structural equation model. The established structural equation model and path analysis are shown in **Figure 1**.



Note: *** means $P < 0.001$, ** means $P < 0.01$, * means $P < 0.05$

Figure 1. Structural equation model path verification of the impact of social anxiety and sleep quality on health among college students.

The results show that the worse the sleep quality, the worse the mental health ($\beta = -0.917$) and social adaptability of college students ($\beta = -0.255$), and the worse the physical health ($\beta = 0.498$). Online social anxiety positively affects offline social anxiety ($\beta = 0.701$) and sleep quality ($\beta = 0.257$); offline social anxiety also positively affects sleep quality ($\beta = 0.087$). Neither online nor offline social anxiety has a direct significant impact on mental health, but both indirectly damage mental health by reducing sleep quality.

4. Discussion

This study found that college students have higher levels of social anxiety, and the level of online social anxiety is slightly higher than offline, which may be related to incomplete online communication information. At the same time, social anxiety is negatively correlated with social adaptability. The reason may be that anxiety leads to social avoidance and reduces the exercise of real-life social skills^[11]. In addition, previous studies have mostly believed that social anxiety has a direct negative impact on mental health^[12]. This study found that the direct effect of social anxiety on mental health is not significant. The possible reason is that short-term anxiety may only cause temporary mood swings, but long-term accumulation can significantly affect mental health. Sleep quality may be the key to preventing anxiety from turning into mental health problems. This study also verified that online social anxiety has a significant positive predictive effect on offline social anxiety. The two types of anxiety do not exist in isolation. Online stress will migrate to offline, triggering discomfort and avoidance behavior among college students.

Mediation effect analysis shows that both online and offline social anxiety can affect health through sleep quality. In terms of physical health, sleep quality plays a partial mediating role. The reason may be that students partially offset the effects of insufficient sleep through healthy behaviors such as exercise and nutritional supplements. Studies by Cai Huangjie and other scholars also mentioned that medical students face high social anxiety, and physiological damage can be partially alleviated through regular work and rest^[13]. This suggests that sleep quality is a bridge between social anxiety and overall health, and that other health behaviors may modulate physiological health pathways.

It is recommended to intervene through students' self-regulation, family emotional communication, and the school's sleep health education and psychological support system construction to alleviate college students' social anxiety, improve

their sleep quality, and enhance the overall health level of this group.

This study also has the following shortcomings: it used non-random sampling, and the representativeness of the sample is limited; the cross-sectional design cannot infer cause and effect; it uses a streamlined scale, and its accuracy needs to be improved.

Disclosure statement

The authors declare no conflict of interest.

References

- [1] Zhong Y, Lin S, Li Y, et al., 2021, Research on Evaluative Fear in Socially Anxious College Students. *Chinese School Health*, 42(9): 1369–1372.
- [2] Ju M, Cai X, Wang J, et al., 2021, Intervention Research on Social Anxiety Disorder Among Chinese College Students: A Review. *Progress in Psychology*.
- [3] Institute of Sociology, Chinese Academy of Social Sciences, 2023, China Sleep Research Report 2023. Social Sciences Literature Press.
- [4] Yue L, Li C, Zhang J, et al., 2014, A Review of the Relationship Between Sleep Quality and Mental Health of Chinese College Students. *Oriental Education*, 2014(5): 60.
- [5] Mattick R, Clarke J, 1998, Development and Validation of Measures of Social Phobia, Scrutiny Fear, and Social Interaction Anxiety. *Behaviour Research and Therapy*, 36(4): 455–470.
- [6] Ouyang X, Cai Y, Tu D, 2020, Psychometric Properties of the Short Forms of the Social Interaction Anxiety Scale and the Social Phobia Scale in a Chinese College Sample. *Frontiers in Psychology*, 11: 2214.
- [7] Liu X, Tang M, Hu L, et al., 1996, Study on the Reliability and Validity of Pittsburgh Sleep Quality Index. *Chinese Journal of Mental Health*, 1996(2): 103–107.
- [8] Li H, Mei J, 2002, Measuring Psychological Problems of College Students: Structure, Reliability and Validity of GHQ-20. *Psychological Development and Education*, 18(1): 75–79.
- [9] Qian Y, Liang Z, Wang C, 2024, Development and Reliability and Validity Testing of Multidimensional Health Assessment Tool for College Students. *Chinese Health Management*, 41(9): 1057–1061.
- [10] Zheng R, 1999, Psychological Diagnosis of College Students. Shandong Education Press.
- [11] Gao W, Cong Z, 2000, The Relationship Between Social Anxiety and College Students' Self-Esteem and Self-Acceptance. *Journal of Health Psychology*, 8(3): 276.
- [12] Li L, 2010, Research on the Relationship Between Social Anxiety, Attachment and Mental Health of College Students. *Chinese Journal of Health Psychology*, 18: 3350–3353.
- [13] Cai H, Guo J, Lai Y, 2022, The Relationship Between Sleep Quality and Anxiety Symptoms in College Students: The Mediating Role of Psychological Flexibility. *Journal of Fujian Medical University (Social Science Edition)*, 23(5): 24–29 + 49.

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