

Prevalence and Correlates of Mental Health Problems in Resident Physicians in Inner Mongolia Autonomous Region: A Cross-Sectional Study

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Objective: This study investigates the prevalence and contributory factors of mental health issues, including anxiety, depression, and insomnia, among resident physicians. Additionally, it endeavors to understand the complex characteristics of these issues across different demographic groups.

Methods: Using an online cross-sectional design, the study engaged resident physicians in Inner Mongolia, China, through convenience sampling. Questionnaires collected data on sociodemographic background, training details, and symptoms of depression, anxiety, and insomnia, assessed using the Patient Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and Insomnia Severity Index (ISI). Conduct latent class analysis on psychological issues using Mplus software. Analyze the related influencing factors of different group characteristics using a multivariate logistic regression model.

Results: The study comprised 2891 resident physicians, revealing that 20.3% experienced moderate to severe anxiety, 19.72% had moderate to severe depression, and 9.6% faced moderate to severe insomnia. Latent class analysis identified three distinct mental health groups: a high anxiety-depression-insomnia group, a low anxiety-depression-healthy sleep group, and a moderate anxiety-mild depression-variable insomnia group. Factors such as training stage, professional accomplishments, self-reported medical errors, self-esteem, perceived stress, and social support were significantly associated with mental health issues, as identified by multivariate logistic regression.

Conclusion: The mental health problems among residents are prominent. By analyzing mental health status and influencing factors, residents can be categorized into different groups, allowing for more targeted interventions. These interventions may include stress management, communication skills training, crisis intervention, and the development of support systems, along with improvements to the work environment and a focus on humanistic care.

Keywords: resident physicians, mental health, anxiety, depression, insomnia, latent class analysis, determinants

Introduction

The residency training phase is crucial in the professional development of physicians. At this stage, residents encounter several challenges, requiring quick adaptation to a high-pressure working environment and continual learning through practice. Factors such as long working hours, intense psychological stress, and insufficient sleep are prevalent in this environment and closely associated with the common mental health issues among medical residents.¹

Resident physicians are commonly confronted with significant mental health challenges, including anxiety, depression, and insomnia. A comprehensive systematic review and meta-analysis, encompassing research from all five continents, revealed that the prevalence of depression or depressive symptoms in medical residents stands at 28.8%, with ranging between 20.9% and 43.2%.² Additionally, anxiety symptoms are reported in approximately 37% of residents,³ while insomnia affects up to 26.7% of this population.⁴ This rate significantly exceeds observed variation

the lifetime prevalence of depression in the general population.⁵ The mental health issues of resident physicians not only affect the individuals themselves but also have broader implications. Mental health issues not only increase the risk of medical errors and suicidal ideation^{6–8}, but may also lead to burnout among resident physicians, reduced work efficiency, and ultimately affect the quality and safety of patient care.⁹

In Inner Mongolia, resident physicians face unique challenges due to the region's limited medical resources, high patient volume, and remote geographical location. These factors may exacerbate their mental health issues, making it particularly important to study this group. This article aims to delve into how the demographic characteristics, personal traits, and work-related factors of resident physicians impact the mental and psychological health issues of different groups of resident physicians. By understanding these dynamics, we can more effectively develop preventive and intervention measures, such as strengthening social support systems, reasonably adjusting workloads, and providing mental health resources, thereby protecting the mental health of resident physicians and enhancing the overall quality of healthcare services.

Methods

Participants and Procedure

This study is a survey conducted among all resident physicians undergoing standardized training at national Western medicine residency training bases in the Inner Mongolia Autonomous Region. The total number of resident physicians recruited in the region is 4643. Ultimately, 2891 valid questionnaires were collected, resulting in a response rate of 62.27%. The number of valid questionnaires collected has exceeded half of the total number of resident physicians in the region, meeting the sample size requirement.

Methods

This study utilized a cross-sectional survey approach with cluster sampling. Resident physicians at 17 training facilities in the Inner Mongolia Autonomous Region were invited to participate in this study on a voluntary basis. Prior to filling out the questionnaire, participants were asked to sign an informed consent form. Data collection took place from April 21, 2023, to April 28, 2023, via the Questionnaire Star platform. The survey questionnaire included standardized instructions that outlined the survey's objectives and assured respondents of confidentiality. The survey was carried out following the receipt of informed consent, with each participant ID configured to permit only a single submission. The questionnaire was structured to be completed within a 10 to 15-minute time frame, and respondents were expected to finish the questionnaire within the allotted time. The questionnaire had to be fully answered before submission, and any that were completed in 5 minutes or less were deemed invalid. Additionally, questionnaires with identical responses to all items were flagged as potentially invalid. This study was approved by the Medical Ethics Committee of Inner Mongolia Autonomous Region Mental Health Center (approval number: 2022003).

Self-Designed General Information Survey Form

Includes demographic information and training-related information. Demographic information includes gender, age, marital status, household annual income, and whether the respondent has experienced any major life events in the past two years (separation/divorce, death or serious illness of a close family member, serious injury/traffic accident, violent incident, unemployment, major natural disaster, death or serious illness of a partner, major conflict with family members, medical dispute, decrease in income/financial liabilities). Training-related information includes training base, training type, training phase, weekly working hours, and frequency of night shifts.

Depressive Symptoms

Patient Health Questionnaire-9 (PHQ-9)¹⁰ is an effective self-report instrument for assessing symptoms of depression. Comprising 9 items, the PHQ-9 has a total score range of 0 to 27, with higher scores indicating more severe symptoms of depression. A score of 0 to 4 is considered normal, 5 to 9 represents mild depression, 10 to 14 indicates moderate depression, and 15 to 27 signifies severe depression. A PHQ-9 score of 10 or above has been proven to be the optimal

threshold for detecting clinical depression.¹¹ In this study, the reliability of the PHQ-9 scale was indicated by a Cronbach's alpha coefficient of 0.935.

Anxiety Symptoms

The Generalized Anxiety Disorder-7 (GAD-7) is an effective self-report instrument for assessing symptoms of anxiety.¹² The GAD-7 includes seven items, each asking respondents to rate the frequency of specific anxiety symptoms they have experienced in the past two weeks. The response for each item ranges from 0 (not at all) to 3 (nearly every day), with a total score ranging from 0 to 21. Anxiety levels are categorized as normal (0–4), mild (5–9), moderate (10–14), and severe (15–21). A GAD-7 score of 10 or higher is considered the cutoff point for delineating anxiety.¹³ In this study, the reliability of the GAD-7 scale was indicated by a Cronbach's alpha coefficient of 0.949.

Insomnia Symptoms

The Insomnia Severity Index (ISI)¹⁴ is a self-report scale used to assess the severity of insomnia symptoms and their impact on daily life. Each item is rated on a scale from 0 (no problem) to 3 (very severe problem), with total scores ranging between 0 and 28. The categories are defined as no insomnia (0–7), subthreshold insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28). In this study, the reliability of the ISI scale was indicated by a Cronbach's alpha coefficient of 0.895.

Statistical Analysis

In this investigation, data processing and analysis were conducted utilizing SPSS and Mplus software. For continuous variables adhering to a normal distribution, results were presented as mean \pm standard deviation. For continuous variables that deviated from normal distribution, results were presented as median (interquartile range). Categorical variables were expressed as frequencies (percentages). Latent class analysis (LCA) was performed using Mplus software to identify unobserved subgroups within the dataset, with subgroups characteristics delineated through model parameters interpretation.¹⁵ Additionally, multivariate logistic regression models were used to examine the factors influencing the characteristics of various groups experiencing mental and psychological issues. The significance level for all statistical tests was set at $\alpha=0.05$.

Results

General Sociodemographic Characteristics of Resident Physicians

In this web-based cross-sectional survey, a total of 2891 resident physicians participated. The gender composition was 1044 males (36.10%) and 1847 females (63.90%). The mean age of the participants was 27 years. Among them, 54.40% were full-time professional master's degree students, while 10.50% were physicians undergoing training within their own institutions and 25.20% were in external institutions. Physicians recruited from the general public constituted 9.80%. Regarding marital status, 24.40% of the respondents were married, and a significant majority (95.50%) identified as heterosexual. Approximately 70.10% of the resident physicians had successfully passed the professional medical examination. The distribution of residents across training years was fairly even, with 34.10% in their first year, 31.30% in their second year, and 34.50% in their third year. The most common weekly working hours were between 41 to 50, accounting for 37.70% of the respondents (Refer to [Table 1](#) for comprehensive details).

Incidence of Anxiety, Depression, and Insomnia in Resident Physicians

[Table 2](#) illustrates the findings from a survey conducted on 2891 resident physicians, revealing that 587 (20.3%) exhibited moderate to severe anxiety symptoms (GAD-7 score ≥ 10); 570 (19.72%) showed moderate to severe depressive symptoms (PHQ-9 score ≥ 10); and 278 physicians (9.6%) presented with moderate to severe insomnia symptoms (ISI score ≥ 15), of which 221 (7.6%) had moderate insomnia and 57 (2%) had severe insomnia.

Table 1 Sociodemographic Characteristics of Resident Physicians Survey Sample

Category	Group	number	Proportion (%)
Gender	Male	1044	36.1
	Female	1847	63.9
Age		27 (26, 29)	
Marital Status	Single	1230	42.5
	In a relationship	927	32.1
	Married	706	24.4
	Divorced	9	0.3
	Other	19	0.7
Annual Household Income (CNY)	Less than 50,000	1100	38
	50,000–100,000	1194	41.3
	110,000–200,000	467	16.2
	210,000–300,000	87	3
	More than 300,000	43	1.5
Training Type	Full-time Professional Master's Degree Students	1574	54.4
	In-house Commissioned Physicians	305	10.5
	External Commissioned Physicians	728	25.2
	Open Recruitment Physicians	284	9.8
Training Phase	First Year	985	34.1
	Second Year	905	31.3
	Third Year	996	34.5
	Extended Training	5	0.2
Working Hours (hours)	<40	787	27.2
	41–50	1089	37.7
	51–60	505	17.5
	61–70	222	7.7
	71–80	158	5.5
	>80	130	4.5
Night Shift Frequency	4 times/month	543	18.8
	More than 4 times/month	895	31
	Less than 4 times/month	677	23.4
Major Life Experiences	No night shifts	776	26.8
	Yes	254	8.8
	No	2637	91.2

Table 2 Prevalence of Anxiety, Depression, and Insomnia Symptom Severity Among Resident Physicians

Symptom	Mild	Moderate	Severe	Detection Rate of Moderate and Severe (%)
Anxiety	1127 (39%)	397 (13.7%)	190 (6.6%)	587 (20.3%)
Depression	1141 (39.47%)	291 (10.07%)	279 (9.65%)	570 (19.72%)
Insomnia	810 (28%)	221 (7.6%)	57 (2%)	278 (9.6%)

Stratification of Resident Physicians with Mental and Psychological Disorders Based on Latent Analysis

Assessment of the Latent Class Model for Mental and Psychological Conditions in Resident Physicians

As shown in [Table 3](#), the study indicates that a lower BIC value suggests that the model has a better fit compared to other models, but the entropy value of the model can reflect its advantage in terms of classification accuracy. In this latent class analysis model, the entropy value for the third category is 0.848, and for the fourth category, it is 0.823. Based on a comprehensive analysis of these indicators, the model structure with three categories is ultimately retained for subsequent analysis.

Table 3 Fit results of the Latent Class Model for Different Subtypes of Mental and Psychological Issues Among Resident Physicians (n=2891)

Category	AIC	BIC	aBIC	Entropy	P _{LMR}	P _{BLRT}	Category Probability
1	19,092.781	19,146.505	19,117.909				
2	16,680.609	16,794.026	16,733.657	0.795	P<0.001	P<0.001	0.495/0.505
3	15,688.873	15,861.985	15,769.841	0.848	P<0.001	P<0.001	0.166/0.440/0.394
4	15,628.122	15,860.927	15,737.010	0.823	P<0.001	P<0.001	0.104/0.096/0.403/0.396

Identification of Latent Categories in Mental and Psychological Conditions Among Resident Physicians

Employing latent class analysis (LCA), the study discerned three distinct latent categories related to mental health states in resident physicians, [Figure 1](#) focusing on the severity of anxiety, depression, and insomnia. This examination, which spanned a sample of 2891 resident physicians, delineated three distinct latent profiles of mental health conditions:

High Anxiety-Depression-Insomnia Group (Category 1): This segment comprises 479 resident physicians, representing 16.57% of the total surveyed population. These individuals predominantly exhibit moderate to severe levels of anxiety and depression, coupled with varying degrees of insomnia, highlighting considerable psychological distress and sleep-related issues.

Moderate Anxiety-Mild Depression-Variable Insomnia Cohort (Category 3): Including 1139 resident physicians, this group makes up 39.40% of the sample. Characterized by mild to moderate anxiety symptoms, slight depression, and a fluctuating presence of insomnia, this suggests that these physicians are likely navigating through processes of psychological adjustment and adaptation.

Low Anxiety-Low Depression-Healthy Sleep Group (Category 2): Encompassing 1273 resident physicians, this group accounts for 44.03% of the sample. Members of this cohort show minimal symptoms associated with anxiety, depression, and insomnia, indicating well-maintained mental health and a high capability for managing stress.

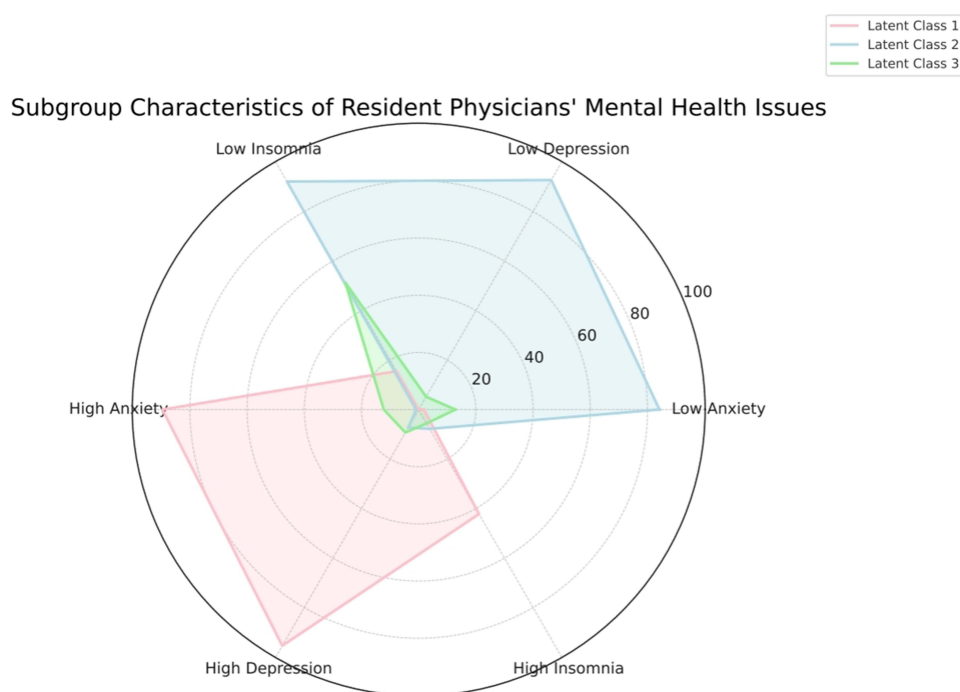
**Figure 1** The radar chart visually represents the distribution of different subgroups of resident physicians' mental health issues across multiple dimensions using color and shape distinctions.

Table 4 Factors Influencing Mental Health Classification Among Resident Physicians – Results From Multinomial Logistic Regression

Variable Name	Mod Anxiety-Mild Dep.-Var Insomnia Group					High Anxiety-Dep.-Insomnia Group				
	Coef	z-Value	OR	95% CI for OR	p	Coef	z-Value	OR	95% CI for OR	p
Age	−0.029	−1.387	0.971	0.932–1.012	0.166	0.069	2.01	1.072	1.002–1.147	0.044
Sexual Orientation	0.134	1.144	1.143	0.909–1.437	0.253	0.022	0.13	1.022	0.736–1.419	0.896
Training Type	−0.068	−1.373	0.934	0.848–1.030	0.17	−0.268	−3.224	0.765	0.650–0.900	0.001
Training Stage	0.363	3.976	1.438	1.202–1.720	<0.001	0.819	5.861	2.269	1.725–2.984	<0.001
Major Life Events	−0.283	−1.481	0.754	0.518–1.096	0.138	−0.892	−3.524	0.41	0.250–0.673	<0.001
Professional Achievement Score	−0.047	−4.945	0.954	0.937–0.972	<0.001	−0.074	−4.806	0.929	0.901–0.957	<0.001
Medical Error Self-reporting Score	0.062	2.774	1.064	1.018–1.111	0.006	0.152	4.905	1.165	1.096–1.238	<0.001
Bullying Score	0.014	1.736	1.014	0.998–1.031	0.083	0.036	3.191	1.036	1.014–1.059	0.001
Self-evaluation Score	−0.116	−7.915	0.891	0.865–0.916	<0.001	−0.196	−8.168	0.822	0.785–0.862	<0.001
Stigmatization Score	0.071	3.564	1.073	1.032–1.116	<0.001	0.156	5.078	1.169	1.101–1.242	<0.001
Happiness Score	−0.102	−10.362	0.903	0.886–0.921	<0.001	−0.265	−15.217	0.767	0.741–0.794	<0.001
Job Burnout Degree	0.213	3.518	1.237	1.099–1.392	<0.001	0.542	6.034	1.719	1.442–2.049	<0.001
Perceived Stress Level	0.402	4.894	1.494	1.272–1.755	<0.001	1.114	8.194	3.047	2.334–3.977	<0.001
Social Support Perception	−0.784	−8.29	0.457	0.380–0.550	<0.001	−1.228	−8.532	0.293	0.221–0.388	<0.001

Influential Factors on Mental and Psychological Issues Among Resident Physicians
This study employed multiclass logistic regression analysis to investigate the impact of multiple variables on the classification of individuals with mental health issues. Using the low anxiety-low depression-healthy sleep group as a reference, the study analyzed the associations between different mental health status groups.(Refer to Table 4 and Figure 2 for detailed outcomes).

Discussion

This investigation comprehensively assessed the mental and psychological health status among 2891 resident physicians, with females constituted 63.90% and males 36.10% of the population, with an average age of 27 years. A significant proportion, 54.40%, were enrolled as full-time professional master’s degree students. The study found that 20.30% of the physicians exhibited moderate to severe symptoms of anxiety, 19.72% showed signs of moderate to severe depression, and 9.60% were dealing with moderate to severe insomnia. These findings are consistent with similar studies conducted both domestically and internationally. For instance, Zhang Lei et al reported that over fifty percent of resident physicians frequently or constantly experienced stress, and 31.6% reported poor mental health conditions.¹⁶ Additionally, a study in Brazil found positive screening rates for depression, anxiety, and occupational burnout at 46.9%, 56.6%, and 37.0%, respectively.¹⁷ These findings indicate that the pervasive and serious nature of mental health challenges among resident physicians globally.

Utilizing latent class analysis (LCA), we identified three distinct latent categories of mental health conditions among resident physicians: a High Anxiety-Depression-Insomnia group, a Low Anxiety-Low Depression-Healthy Sleep group, and a Moderate Anxiety-Mild Depression-Variable Insomnia group. Model evaluation metrics,¹⁸ including the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and sample-size adjusted BIC (sBIC), confirmed that the three-class model fits the data well. Notably, the model’s entropy value of 0.848 indicates high classification accuracy, aligning with the findings of Lubke et al, who emphasized the efficacy of LCA in categorizing complex mental health data.¹⁹

Further multivariate logistic regression analysis identified significant associations between various factors and the occurrence of mental health issues among resident physicians. Factors such as the type of training (particularly full-time professional master’s programs), training phase, weekly working hours, and major life events are significantly associated

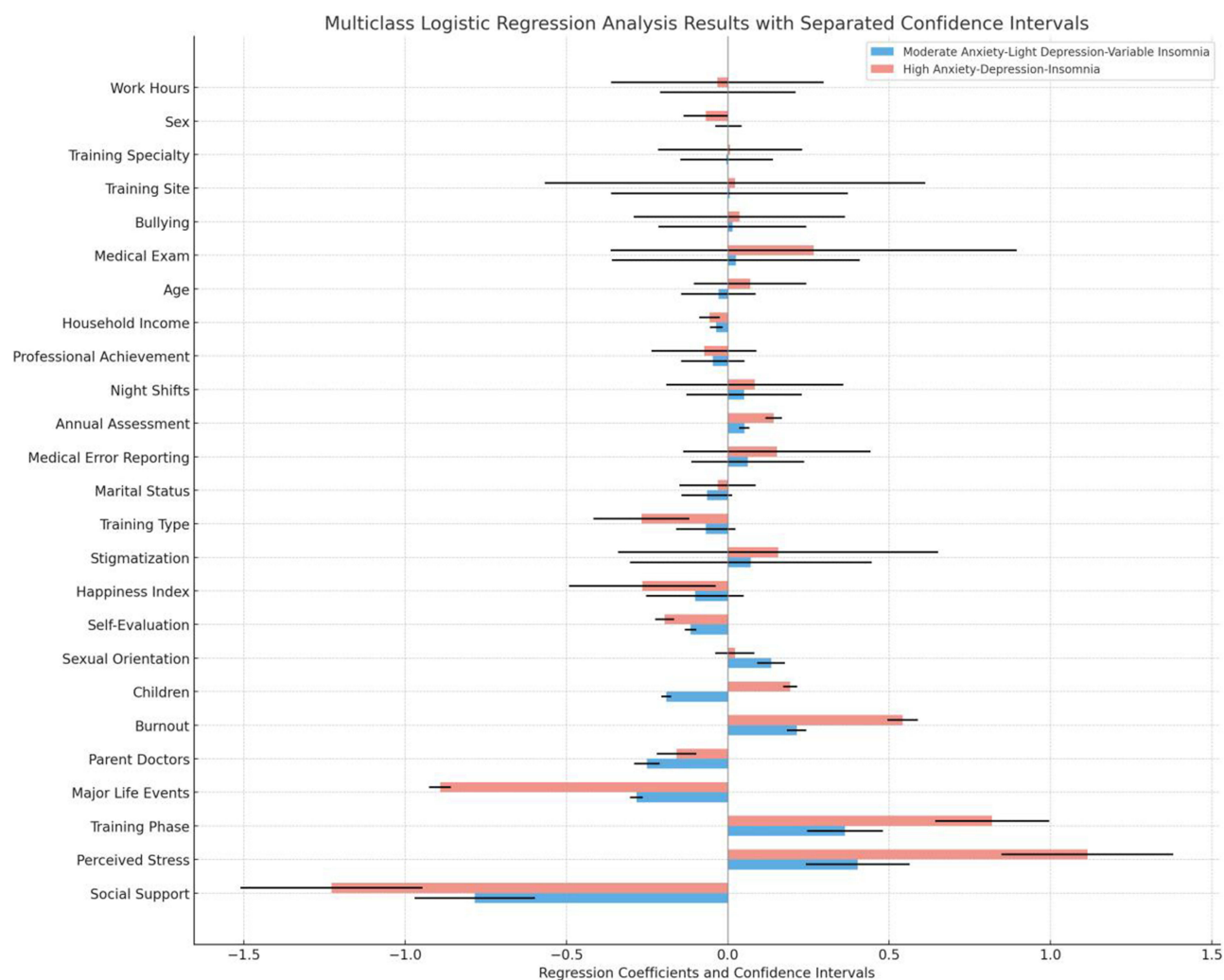


Figure 2 This figure presents a comparison of regression coefficients, reflecting the influence of selected variables on the likelihood of resident physicians being categorized into either the Moderate Anxiety-Mild Depression-Variable Insomnia group or the High Anxiety-Depression-Insomnia group. The bars represent the coefficient values, with the error bars denoting the 95% confidence intervals.

with the occurrence of mental health issues among resident physicians. Consistent with existing research,^{20,21} higher training phases and perceived stress were associated with poorer mental health, while stronger social support is associated with better mental health conditions.

Therefore, by reducing stress factors in the work environment and providing comprehensive social support, including psychological counseling services and material assistance, physicians can obtain the necessary emotional and material support when facing challenges. Regular assessments and monitoring of job burnout should be conducted for resident physicians, and a long-term occupational health support system should be established to promote the physical and mental health of residents. By effectively maintaining the occupational health of resident physicians, the quality and efficiency of medical services can be enhanced.

This study has several limitations: Firstly, data collection was carried out using an online questionnaire, which may introduce selection bias, and the research findings could be influenced by subjective factors. Secondly, the cross-sectional study design does not allow for the establishment of a causal relationship between influencing factors and categories of job burnout. Future research could further investigate the causal relationship between these factors through longitudinal studies.

Conclusion

This study finds a widespread and severe presence of mental health issues among resident physicians in Inner Mongolia, highlighting the urgency of taking targeted measures to promote their mental well-being. To gain a deeper understanding of these issues, future research should broaden its scope to include variables such as cultural factors, organizational policies, and coping strategies. Medical institutions need to prioritize comprehensive intervention strategies, which include enhancing support measures at different training stages, implementing stress management programs, improving job satisfaction, increasing self-efficacy, and reinforcing social support networks. Adopting these diverse intervention methods is crucial for effectively alleviating the mental health pressures faced by resident physicians.

Ethical Statement

This study has been reviewed by the Ethics Committee of Inner Mongolia Mental Health Center. All participants had given informed consent before this study was conducted. Confirmation that the guidelines outlined in the Declaration of Helsinki were followed.

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Disclosure

The authors report no conflicts of interest in this work.

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