

Analysis of Occupational Mental Health Status and Influencing Factors among Tertiary Industry Workers

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Abstract: ***Objective:** This study investigates and statistically analyzes the mental health issues of workers in the tertiary industry, examining the influencing factors to provide empirical evidence for the development of strategies aimed at promoting occupational mental health. **Methods:** A cross-sectional study was conducted. A total of 2,705 front-line workers from five industries—environmental sanitation, transportation, education, delivery/takeout and healthcare—were selected using cluster sampling. Participants' physical and mental health status was assessed using the *National Survey Questionnaire on Occupational Health Literacy among Key Populations*. Statistical analyses were performed using the chi-square test and logistic regression models. **Results:** The findings revealed that mental health problems were prevalent among tertiary industry workers, with sleep disorders (90.1%) and depressive symptoms (74.0%) being particularly prominent. Depression risk in female workers was primarily associated with structural social inequalities. Age exhibited differential effects: occupational stress peaked in the 30~<40 age group, whereas the risk for depression and anxiety was highest in the 40~<50 age group. Higher monthly income ($\geq 5,000$ RMB) was identified as an independent risk factor for depression and anxiety. Working 45~<49 hours per week represented a specific risk window for sleep disorders. Night shift work and marital status did not demonstrate independent protective effects on mental health ($P > 0.05$). **Conclusion:** Tertiary industry workers face significant mental health risks, influenced by complex and heterogeneous factors. Improving the mental health status of this population requires systematic intervention strategies, encompassing policy and regulatory safeguards, optimization of work organization, and precise support at the individual level.*

Keywords: Tertiary industry workers, Occupational mental health, Influencing factors, Mental health status, Occupational stress.

1. Introduction

As the concept of health has evolved, modern health sociology has moved beyond the limitations of the traditional biomedical model, redefining health as a dynamic equilibrium encompassing the “biological-psychological-social (Bio-Psycho-Social Model)” dimensions [1]. Within this framework, the mental health of the workforce has emerged not merely as a medical issue but as a critical social indicator for gauging the quality of social development and public well-being [2]. Against the backdrop of global economic restructuring and the rise of the service sector, occupational stress and psychological distress have become pervasive issues affecting service industry workers, recognized by the World Health Organization as a serious public health challenge [3]. Over the past five years, research has further elucidated the complex mechanisms underlying occupational psychosocial risks. Established studies have identified job insecurity, high job demands, and low job control as core occupational risk factors for depression and anxiety, with particularly pronounced effects in the service industry [4-5]. Furthermore, long working hours have been robustly associated with higher risks of cardiovascular disease and depression, providing empirical evidence for the causal pathway between occupational stress and physical/mental health [6-7]. In this context, emerging psychosocial hazards within the service sector have garnered attention, including the prevalence of emotional labor, the blurring of boundaries between work and life, and the rise of algorithmic management, all of which have become non-negligible influencing factors [8]. Despite this growing awareness of risks, the field continues to face three major challenges

regarding intervention and governance. First, a mismatch exists between job characteristics and intervention models: High staff turnover and fragmented working hours (e.g., shift work, gig work) in the service industry hinder the reach and follow-up of traditional, fixed-location, fixed-time psychological services, leading to a disconnect between screening and intervention. Second, organizational support is lacking while stressors persist: Small and micro-enterprises often lack the willingness and capacity to provide psychological support. Concurrently, workers chronically face “emotional labor” (e.g., suppressing emotions to deal with customers) and interpersonal conflicts, structural pressures that are difficult to alleviate through short-term individual counseling. Third, social stigma impedes help-seeking behavior: Influenced by traditional cultural norms, mental health issues like depression and anxiety are easily stigmatized. Workers fear being labeled as “weak,” resulting in weak help-seeking awareness and a tendency to endure suffering silently or resort to maladaptive coping mechanisms.

Against the backdrop of China's deepening economic structural transformation, the tertiary industry has become the core engine of economic growth and employment, with its workforce size continuously expanding. In this context, the mental health problems of workers in this sector have become increasingly prominent, exhibiting typical characteristics of a “structural upgrade.” Collaborative data from the World Health Organization (WHO) and Gallup indicated that the proportion of Chinese tertiary industry workers self-reporting mental health problems was significantly higher than the global average, reflecting the complex pressures they face

within a unique occupational ecology [3,9-10]. Widespread issues within the industry, such as high-intensity work rhythms, sustained emotional labor, high-performance pressure, and relatively lagging social security, render the mental health risks of workers highly invisible, and existing policy tools centered on preventing physical injuries are inadequate to address them effectively [11-13]. Based on this background, this study focused on tertiary industry workers in Jiulongpo District, Chongqing, aiming to systematically analyze their current mental health status and its influencing factors.

2. Methods

2.1 Study Design and Population

In accordance with the *National Technical Protocol for Monitoring and Intervention on Occupational Health Literacy among Key Populations* [14] (hereinafter referred to as the Technical Protocol), a cross-sectional survey was conducted from 2022 to 2024 among front-line workers in the tertiary industry in Jiulongpo District, Chongqing, using a cluster sampling method. The inclusion criteria for participants in this study were as follows: (1) being a front-line worker engaged in the tertiary industry; (2) having no severe cognitive impairment or acute mental illness; (3) voluntarily signing an informed consent form to participate in the survey; (4) possessing the basic ability to comprehend the content and purpose of the investigation; and (5) being aged ≥ 16 years. This study strictly adhered to the standardized survey procedures outlined in the *National Individual Questionnaire for Monitoring Occupational Health Literacy among Key Populations*. An electronic questionnaire system was employed, whereby participants completed the survey on-site by scanning a Quick Response (QR) code using their mobile phones. Participants independently scanned a unique QR code in a private setting to complete the questionnaire. Multiple quality control measures were implemented throughout the survey process: the system automatically identified duplicate submissions, incorporated built-in logic checks (including skip patterns and range validation), and designated certain questions as mandatory. By leveraging the real-time monitoring function of the backend of the electronic data collection platform, combined with data encryption during transmission and storage, the authenticity, completeness, and validity of the survey data were effectively ensured. This fully complied with the quality control standards of the *Technical Protocol* and the confidentiality specifications required by ethical review.

2.2 Data Collection Variable Definitions

The investigation and analysis in this study primarily focused on two sections of the Technical Protocol: "Occupational Mental Health Status" and "Basic Information." The content included the following: (1) Occupational Stress Scale [11]: Each item was scored using a Likert scale, where "strongly disagree" was assigned 1 point, "disagree" 2 points, "somewhat agree" 3 points, "agree" 4 points, and "strongly agree" 5 points. Based on the total score calculated from the 17 items, a score of ≥ 50 points indicated the presence of occupational stress. A higher total score signified a greater severity of occupational stress for the worker. (2) Depression

Scale [12]: Each item was scored using the PHQ-9 scoring method, where "not at all" was assigned 0 points, "several days" 1 point, "more than half the days" 2 points, and "nearly every day" 3 points. Scoring was conducted according to these rules. Total scores of 0-4 indicated "no depressive symptoms," 5-9 indicated "mild depressive symptoms," 10-14 indicated "moderate depressive symptoms," 15-19 indicated "moderately severe depressive symptoms," and 20-27 indicated "severe depressive symptoms." (3) Anxiety Scale [13-14]: Each item was scored using the GAD-7 scoring method, where "not at all" was assigned 0 points, "several days" 1 point, "more than half the days" 2 points, and "nearly every day" 3 points. Scoring was conducted according to these rules. Total scores of 0-4 represented no anxiety, 5-9 represented mild anxiety, 10-14 represented moderate anxiety, and 15-21 represented severe anxiety. (4) Sleep Scale [15]: Three items were used to assess three categories of sleep symptoms: difficulty falling asleep, difficulty maintaining sleep, and early morning awakening. The presence of any one of these symptoms was classified as indicating a sleep disorder.

2.3 Statistical Analysis

A database was established using WPS Office XLSX worksheets. Statistical processing and analysis of the data were performed using SPSS software (version 26.0). Descriptive statistical analysis was conducted to characterize the sample. Between-group comparisons were evaluated using the chi-square (χ^2) test. Multivariate logistic regression analysis was employed to identify factors associated with mental health outcomes. $P < 0.05$ was considered to indicate a statistically significant difference.

2.4 Ethics Statement

This study protocol was reviewed and approved by the Institutional Ethics Review Committee of our institution (approval No. JLPJK-E-2026-03-01). Written informed consent was obtained from all participants at the time of enrollment.

3. Results

3.1 Basic Characteristics

This study employed a multi-industry cross-sectional survey design. A total of 2,815 front-line workers from five key service industries were initially surveyed, yielding a final valid sample of 2,705 participants, corresponding to an effective response rate of 96%. The industry-specific distribution was as follows: healthcare ($n = 978$), education ($n = 614$), transportation ($n = 537$), environmental sanitation ($n = 295$), and delivery/takeout ($n = 281$). Among the study participants, 64.3% ($n = 1,740$) were female and 35.7% ($n = 965$) were male. Regarding age distribution, the largest group was aged 30~<40 years, accounting for 36.6% ($n = 990$), followed by those aged 40~<50 years (25.4%, $n = 686$), those aged ≥ 50 years (24.5%, $n = 663$), and those aged <30 years (13.5%, $n = 366$). The majority of participants were married, representing 76.2% ($n = 2,061$) of the sample. In terms of educational attainment, the largest proportion held a master's degree or higher (51.1%, $n = 1,381$), followed by an associate

or bachelor's degree (18.5%, $n = 501$), a high school/vocational diploma (13.9%, $n = 375$), and middle school education or below (16.6%, $n = 448$). Personal monthly income, the most prevalent category was 3,000~<5,000 RMB (40.2%, $n = 1,087$), followed by 5,000~<7,000 RMB (29.7%, $n = 804$), $\geq 7,000$ RMB (16.6%, $n = 450$), and <3,000 RMB (13.5%, $n = 364$). Regarding weekly working hours, 29.4% ($n = 795$) worked ≤ 40 hours, 24.5% ($n = 662$) worked 41~<45 hours, 18.1% ($n = 489$) worked 45~<49 hours,

11.3% ($n = 307$) worked 49~<55 hours, and 16.7% ($n = 452$) worked ≥ 55 hours. A majority of participants (67.3%, $n = 1,821$) reported engaging in shift work, including night shifts, while 32.7% ($n = 884$) did not. The overall prevalence rates of mental health problems were as follows: sleep disorders was reported by 90.1% ($n = 2,438$) of participants, depressive symptoms by 74.0% ($n = 2,002$), anxiety symptoms by 37.9% ($n = 1,026$), and occupational stress by 20.6% ($n = 556$). Detailed data are presented in Table 1.

Table 1: Basic Characteristics and Prevalence of Occupational Mental Health Problems (N=2705)

Variable	Category	N(%)	Occupational Stress n(%)	Depressive Symptoms n(%)	Anxiety Symptoms n(%)	Sleep Disorders n(%)
Total	—	2705(100)	556(20.6)	2002(74)	1026(37.9)	2438(90.1)
Sex	Male	965(35.7)	137(14.2)	686(71.1)	316(32.7)	839(86.9)
	Female	1740(64.3)	419(24.1)	1316(75.6)	710(40.8)	1599(91.9)
Age	<30	366(13.5)	97(26.5)	269(73.5)	133(36.3)	321(87.7)
	30~<40	990(36.6)	216(21.8)	782(79.0)	449(45.3)	910(91.9)
	40~<50	686(25.4)	126(18.4)	511(74.5)	249(36.3)	613(89.3)
	≥ 50	663(24.5)	117(17.6)	440(66.4)	195(29.4)	594(89.6)
Marital Status	Unmarried	484(17.9)	103(21.3)	389(80.4)	200(41.3)	454(93.8)
	Married	2061(76.2)	423(20.5)	1494(72.5)	765(37.1)	1852(89.9)
	Widowed/Divorced/Other	160(5.9)	30(18.8)	119(74.4)	61(38.1)	132(82.5)
Educational Attainment	$\leq$ Middle school	448(16.6)	98(21.9)	269(60.0)	145(32.4)	373(83.3)
	High school/Vocational	375(13.9)	89(23.7)	259(69.1)	100(26.7)	275(73.3)
	Associate /Bachelor's	501(18.5)	91(18.2)	380(75.8)	203(40.5)	459(91.6)
	$\geq$ Master's	1381(51.1)	278(20.1)	1094(79.2)	578(41.9)	1331(96.4)
Personal Monthly Income (RMB)	<3 000	364(13.5)	76(20.9)	255(70.1)	131(36.0)	323(88.7)
	3 000~<5 000	1087(40.2)	227(20.9)	822(75.6)	389(35.8)	977(89.9)
	5 000~<7 000	804(29.7)	164(20.4)	608(75.6)	339(42.2)	731(90.9)
	$\geq 7 000$	450(16.6)	89(19.8)	317(70.4)	167(37.1)	407(90.4)
	≤ 40	795(29.4)	164(20.6)	596(75.0)	296(37.2)	719(90.4)
Weekly Working Hours (h)	41~<45	662(24.5)	142(21.5)	485(73.3)	240(36.3)	606(91.5)
	45~<49	489(18.1)	94(19.2)	368(75.3)	200(40.9)	438(89.6)
	49~<55	307(11.3)	55(17.9)	229(74.6)	112(36.5)	275(89.6)
	≥ 55	452(16.7)	101(22.3)	324(71.7)	178(39.4)	400(88.5)
Night Shift Work	Yes	884(32.6)	186(21.0)	661(74.8)	338(38.2)	798(90.3)
	No	1821(67.3)	370(20.3)	1341(73.6)	688(37.8)	1640(90.1)
	Env. sanitation	295(10.9)	57(19.3)	221(74.9)	99(33.6)	251(85.1)
	Transportation	537(19.9)	121(22.5)	375(69.8)	201(37.4)	489(91.1)
Industry Type	Education	614(22.7)	83(13.5)	469(76.4)	227(37.0)	561(91.4)
	Delivery/Takeout	281(10.4)	81(28.8)	205(73.0)	110(39.1)	254(90.4)
	Healthcare	978(36.2)	214(21.9)	732(74.8)	389(39.8)	883(90.3)

3.2 Prevalence of Occupational Mental Health Problems by Industry

The prevalence of occupational stress varied significantly across different industries. The delivery/takeout industry exhibited the highest rates of occupational stress across all analyzed subgroups (ranging from 28.1% to 33.5%), whereas the education industry consistently showed the lowest rates (ranging from 10.8% to 20.4%). Female workers and those with a monthly income below 3,000 RMB demonstrated higher levels of stress in most industries; notably, within the delivery/takeout industry, the prevalence of stress among low-income workers reached 33.3%. Depressive symptoms were highly prevalent overall, with detection rates exceeding 60% in all industries surveyed. The healthcare industry reported the highest prevalence of depression across various subgroups (ranging from 70.1% to 77.9%), while the lowest rate was observed among transportation workers with middle school education or below (42.3%). A higher prevalence of depression was observed among night shift workers in the

environmental sanitation and education industries. Among transportation workers, those working ≥ 55 hours per week exhibited a particularly pronounced risk for depression. The prevalence of anxiety symptoms ranged from 25% to 46% across industries. The highest rate was found among low-income workers in the delivery/takeout industry, where the prevalence of anxiety reached 46.1%. Transportation workers with long working hours also showed a relatively high prevalence of anxiety (43.9%). Female workers generally reported higher rates of anxiety in most industries. Night shift work was associated with elevated anxiety levels in the healthcare and environmental sanitation industries. sleep disorders was the most prevalent mental health problem identified, with rates universally exceeding 80% and approaching 90% in most subgroups. Night shift work was associated with the highest or among the highest rates of sleep disorders in four of the five industries surveyed (all except education). sleep disorders was more common among female workers and those aged over 30 years. Notably, among delivery/takeout workers with middle school education or

below, the prevalence of sleep disorders reached 92.5%, representing one of the highest rates observed across all subgroups (see Figure 1).

3.3 Univariate Logistic Regression Analysis of Occupational Mental Health Problems

Univariate logistic regression analyses were conducted with the presence of anxiety symptoms, sleep disorders, occupational stress, and depressive symptoms as dependent variables. Regarding occupational stress, female workers exhibited a higher risk compared to their male counterparts (cOR = 0.522, 95% CI: 0.422–0.645). Workers aged 30~<40 years (cOR = 1.683, 95% CI: 1.239–2.286) and 40~<50 years (cOR = 1.302, 95% CI: 1.014–1.673) demonstrated a higher risk relative to those aged <30 years. Workers in the transportation, education, delivery/takeout, and healthcare industries all exhibited a lower risk of occupational stress compared to those in the environmental sanitation industry ($P < 0.05$). For depressive symptoms, female workers again showed a higher risk than male workers

(cOR = 0.792, 95% CI: 0.664–0.946). All age groups ≥ 30 years had a higher risk compared to the <30 years age group. Workers with educational attainment ranging from high school to bachelor's degree had a lower risk than those with middle school education or below. Furthermore, workers with a personal monthly income $\geq 5,000$ RMB had a higher risk of depressive symptoms compared to those earning <3,000 RMB. In terms of anxiety symptoms, male workers had a lower risk than female workers (cOR = 0.706, 95% CI: 0.599–0.833). All age groups ≥ 30 years had a higher risk compared to the <30 years group, with the highest risk observed in the 40~<50 years age group (cOR = 1.992, 95% CI: 1.617–2.454). Workers with educational attainment from high school to bachelor's degree had a lower risk of anxiety compared to those with middle school education or below. Concerning sleep disorders, male workers had a lower risk than female workers (cOR = 0.587, 95% CI: 0.455–0.757). Workers who were married or in other marital statuses (e.g., widowed, divorced) had a higher risk compared to unmarried workers. A higher level of educational attainment was associated with a lower risk of sleep disorders. Detailed data are presented in Table 2.

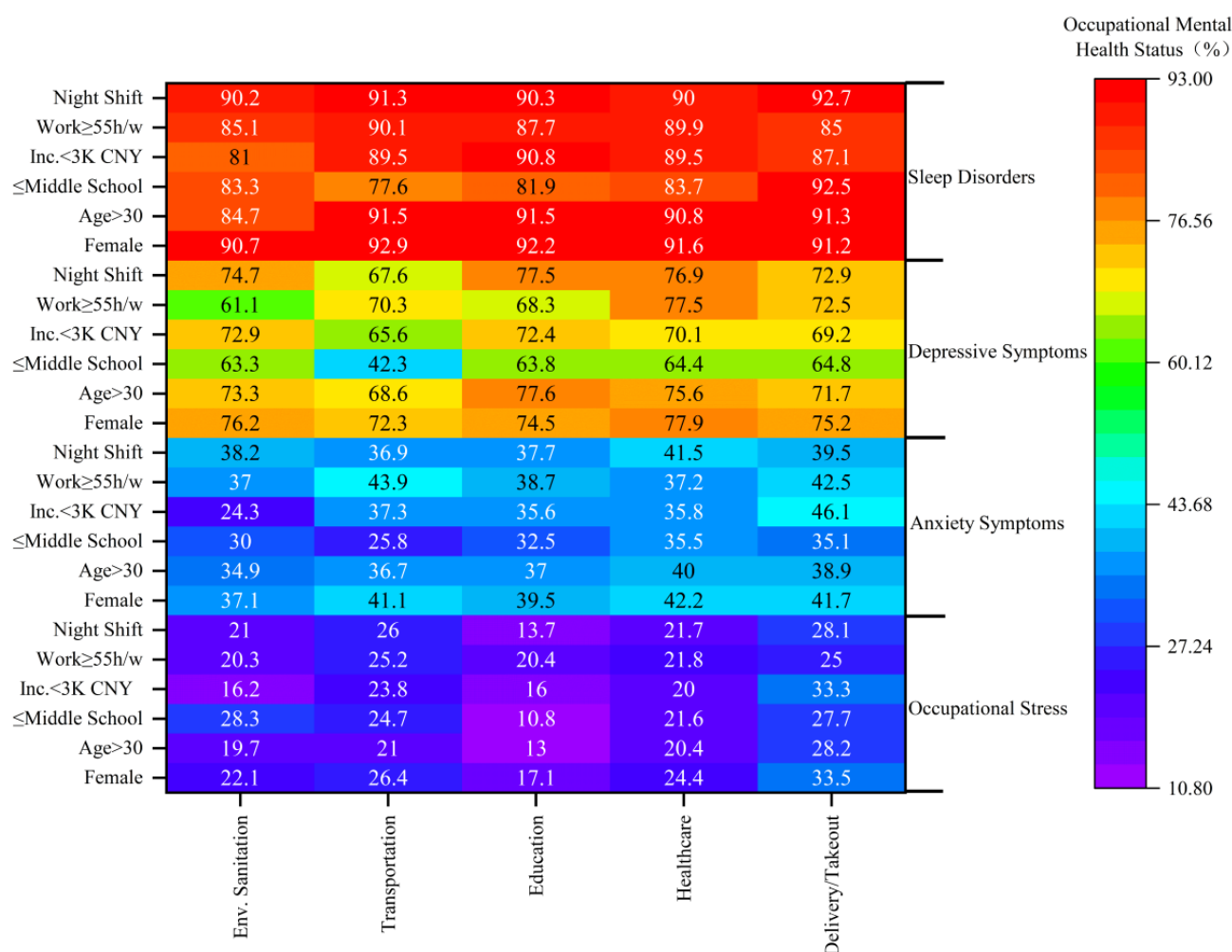


Figure 1: Heatmap of the Prevalence of Occupational Mental Health Problems by Industry

Table 2: Univariate Logistic Regression Analysis of Factors Associated with Occupational Mental Health Problems

Variable	Category	Occupational Stress cOR (95% CI)	P	Depressive Symptoms cOR (95% CI)	P	Anxiety Symptoms cOR (95% CI)	P	Sleep Disorders cOR (95% CI)	P
Sex	Male(ref)	—	—	—	—	—	—	—	—
	Female	0.522(0.422-0.645)	<0.001	0.792(0.664-0.946)	0.010	0.706(0.599—0.833)	<0.001	0.587(0.455—0.757)	<0.001
Age	<30(ref)	—	—	—	—	—	—	—	—
	30~<40	1.683(1.239-2.286)	0.001	1.406(1.060-1.864)	0.018	1.370(1.045—1.796)	0.023	0.829(0.556—1.235)	0.356
	40~<50	1.302(1.014-1.673)	0.039	1.905(1.526-2.379)	<0.001	1.992(1.617—2.454)	<0.001	1.321(0.942—1.853)	0.106
	≥50	1.050(0.795-1.386)	0.731	1.480(1.169-1.873)	0.001	1.368(1.088—1.718)	0.007	0.975(0.689—1.381)	0.889
Marital Status	Unmarried(ref)	—	—	—	—	—	—	—	—
	Married	1.171(0.745-1.842)	0.493	1.411(0.927-2.147)	0.108	1.143(0.792—1.649)	0.475	3.210(1.852—5.565)	<0.001
	Widowed/Divorced/Other	1.119(0.742-1.688)	0.592	0.908(0.628-1.311)	0.606	0.958(0.688—1.334)	0.800	1.880(1.220—2.896)	0.004
Educational Attainment	≤ Middle school(ref)	—	—	—	—	—	—	—	—
	High school/Vocational	1.111(0.857-1.440)	0.427	0.394(0.313-0.496)	<0.001	0.665(0.531—0.833)	<0.001	0.187(0.128—0.272)	<0.001
	Associate /Bachelor's	1.235(0.941-1.620)	0.129	0.586(0.454-0.756)	<0.001	0.505(0.392—0.650)	<0.001	0.103(0.072—0.149)	<0.001
	≥Master's	0.881(0.677-1.145)	0.342	0.824(0.647-1.050)	0.117	0.946(0.769—1.165)	0.603	0.411(0.269—0.627)	<0.001
	<3 000(ref)	—	—	—	—	—	—	—	—
Personal Monthly Income (RMB)	3 000~<5 000	1.070(0.760-1.508)	0.698	0.982(0.726-1.328)	0.904	0.953(0.715—1.270)	0.741	0.832(0.53—1.308)	0.426
	5 000~<7 000	1.071(0.814-1.408)	0.626	1.301(1.018-1.663)	0.035	0.944(0.752—1.186)	0.623	0.938(0.648—1.36)	0.737
	≥7 000	1.039(0.779-1.387)	0.793	1.301(1.005-1.686)	0.046	1.235(0.975—1.566)	0.080	1.058(0.712—1.572)	0.780
Weekly Working Hours (h)	≤40(ref)	—	—	—	—	—	—	—	—
	41~<45	0.903(0.683-1.195)	0.476	1.183(0.912-1.535)	0.205	0.913(0.720—1.158)	0.453	1.230(0.847—1.786)	0.277
	45~<49	0.949(0.711-1.267)	0.722	1.083(0.829-1.414)	0.561	0.875(0.684—1.120)	0.290	1.407(0.945—2.095)	0.093
	49~<55	0.827(0.603-1.134)	0.238	1.202(0.899-1.606)	0.215	1.065(0.821—1.383)	0.635	1.116(0.741—1.681)	0.598
	≥55	0.758(0.526-1.094)	0.139	1.160(0.835-1.611)	0.376	0.884(0.655—1.193)	0.420	1.117(0.701—1.781)	0.641
Night Shift Work	No(ref)	—	—	—	—	—	—	—	—
	Yes	1.045(0.857-1.274)	0.663	1.061(0.883-1.275)	0.529	1.019(0.864—1.198)	0.820	1.024(0.782—1.342)	0.863
Industry Type	Env. sanitation(ref)	—	—	—	—	—	—	—	—
	Transportation	0.591(0.401-0.871)	0.008	1.107(0.763-1.607)	0.592	0.785(0.559—1.103)	0.164	0.606(0.364—1.01)	0.055
	Education	0.718(0.517-0.997)	0.048	0.858(0.622-1.183)	0.351	0.930(0.691—1.251)	0.631	1.083(0.66—1.777)	0.753
	Delivery/Takeout	0.386(0.273-0.546)	<0.001	1.199(0.869-1.655)	0.270	0.912(0.682—1.219)	0.533	1.125(0.692—1.83)	0.635
	Healthcare	0.692(0.513-0.933)	0.016	1.103(0.817-1.489)	0.522	1.027(0.782—1.347)	0.849	0.988(0.63—1.549)	0.958

Note: cOR, crude odds ratio; CI, confidence interval.

3.4 Multivariate Logistic Regression Analysis of Occupational Mental Health Problems

In the multivariate logistic regression models for occupational stress, anxiety symptoms, and sleep disorders, sex emerged as a significant influencing factor, with male workers exhibiting a higher risk compared to female workers. Relative to the <30 years age group, workers aged 30~<40 years demonstrated an increased risk for occupational stress (aOR = 1.473), depressive symptoms (aOR = 1.432), and anxiety symptoms (aOR = 1.324). The risk for depressive symptoms (aOR = 1.867) and anxiety symptoms (aOR = 1.919) was further elevated in the 40~<50 years age group, whereas no significant difference in occupational stress was observed for this age group. No statistically significant associations were found between age group and sleep disorders. Regarding

marital status, married workers had a significantly higher risk of sleep disorders compared to unmarried workers (aOR = 2.031, 95% CI: 1.130–3.648). No significant associations were found between marital status and the other mental health outcomes examined. Concerning educational attainment, workers with a high school education, as well as those with an associate or bachelor's degree, had a significantly lower risk of depressive symptoms, anxiety symptoms, and sleep disorders compared to those with middle school education or below. Workers with a master's degree or higher also exhibited a lower risk of sleep disorders (aOR = 0.405). In terms of personal monthly income, workers earning >5,000 RMB had a higher risk of depressive symptoms compared to those earning <3,000 RMB. Similarly, workers earning ≥7,000 RMB had a higher risk of anxiety symptoms relative to those earning <3,000 RMB (aOR = 1.280, 95% CI: 1.003–

1.632). Regarding working hours, working 45~<49 hours per week was associated with a higher risk of sleep disorders (aOR = 1.574, 95% CI: 1.027–2.414). Night shift work showed no significant association with any of the four mental health problems examined. Concerning industry type, compared to the environmental sanitation industry, workers in the transportation, delivery/takeout, and healthcare industries

had a lower risk of occupational stress, with the lowest risk observed in the delivery/takeout industry (aOR = 0.407, 95% CI: 0.287–0.579). Workers in the transportation industry also had a lower risk of sleep disorders (aOR = 0.562, 95% CI: 0.328–0.964). No significant differences were found between industries for the other mental health outcomes. Detailed data are presented in Table 3.

Table 3: Multivariate Logistic Regression Analysis of Factors Associated with Occupational Mental Health Problems

Variable	Category	Occupational Stress aOR (95% CI)	P	Depressive Symptoms aOR (95% CI)	P	Anxiety Symptoms aOR (95% CI)	P	Sleep Disorders aOR (95% CI)	P
Sex	Male(ref)	—	—	—	—	—	—	—	—
	Female	0.551(0.443—0.683)	<0.001	0.850(0.707—1.022)	0.084	0.764(0.644—0.906)	0.002	0.602(0.458—0.791)	<0.001
	<30(ref)	—	—	—	—	—	—	—	—
Age	30~<40	1.473(1.077—2.014)	0.015	1.432(1.069—1.917)	0.016	1.324(1.004—1.746)	0.047	0.781(0.510—1.196)	0.255
	40~<50	1.199(0.928—1.550)	0.165	1.867(1.484—2.349)	<0.001	1.919(1.550—2.376)	<0.001	1.135(0.792—1.624)	0.490
	≥50	0.993(0.748—1.317)	0.960	1.491(1.172—1.898)	0.001	1.375(1.090—1.734)	0.007	1.035(0.715—1.498)	0.857
Marital Status	Unmarried(ref)	—	—	—	—	—	—	—	—
	Married	1.196(0.751—1.902)	0.451	1.086(0.703—1.676)	0.711	0.968(0.662—1.415)	0.867	2.031(1.130—3.648)	0.018
	Widowed/Divorced/Other	1.108(0.728—1.686)	0.632	0.776(0.531—1.135)	0.192	0.833(0.592—1.173)	0.295	1.473(0.928—2.338)	0.100
Educational Attainment	≤ Middle school(ref)	—	—	—	—	—	—	—	—
	High school/Vocational	1.109(0.848—1.451)	0.450	0.398(0.314—0.504)	<0.001	0.678(0.538—0.855)	0.001	0.196(0.133—0.287)	<0.001
	Associate/Bachelor's	1.276(0.966—1.686)	0.087	0.597(0.460—0.774)	<0.001	0.517(0.400—0.669)	<0.001	0.109(0.075—0.157)	<0.001
	≥ Master's	0.873(0.668—1.140)	0.318	0.790(0.617—1.011)	0.062	0.922(0.746—1.141)	0.456	0.405(0.264—0.622)	<0.001
	<3 000(ref)	—	—	—	—	—	—	—	—
Personal Monthly Income (RMB)	3 000~<5 000	1.075(0.757—1.527)	0.686	0.976(0.715—1.334)	0.881	0.986(0.735—1.323)	0.926	0.840(0.519—1.360)	0.479
	5 000~<7 000	1.079(0.816—1.428)	0.595	1.291(1.003—1.662)	0.048	0.964(0.764—1.218)	0.759	0.926(0.625—1.371)	0.700
	≥7 000	1.025(0.763—1.377)	0.868	1.334(1.021—1.742)	0.035	1.280(1.003—1.632)	0.047	1.121(0.738—1.703)	0.591
	≤40(ref)	—	—	—	—	—	—	—	—
Weekly Working Hours (h)	41~<45	0.914(0.682—1.225)	0.547	1.252(0.952—1.646)	0.108	0.884(0.690—1.133)	0.331	1.344(0.896—2.016)	0.153
	45~<49	0.946(0.702—1.276)	0.717	1.117(0.845—1.476)	0.438	0.848(0.656—1.094)	0.204	1.574(1.027—2.414)	0.038
	49~<55	0.827(0.597—1.145)	0.252	1.251(0.925—1.692)	0.146	1.013(0.772—1.328)	0.928	1.092(0.704—1.693)	0.695
	≥55	0.764(0.525—1.111)	0.159	1.149(0.818—1.612)	0.423	0.846(0.622—1.151)	0.287	1.221(0.741—2.013)	0.434
Night Shift Work	No(ref)	—	—	—	—	—	—	—	—
	Yes	1.035(0.841—1.272)	0.747	1.151(0.948—1.397)	0.156	1.042(0.876—1.239)	0.644	1.076(0.804—1.441)	0.623
	Env. sanitation(ref)	—	—	—	—	—	—	—	—
Industry Type	Transportation	0.600(0.405—0.888)	0.011	1.147(0.783—1.681)	0.481	0.800(0.565—1.133)	0.210	0.562(0.328—0.964)	0.036
	Education	0.734(0.526—1.024)	0.069	0.855(0.614—1.190)	0.353	0.942(0.695—1.277)	0.701	1.003(0.596—1.688)	0.990
	Delivery/Takeout	0.407(0.287—0.579)	<0.001	1.183(0.849—1.647)	0.322	0.923(0.686—1.243)	0.597	1.038(0.623—1.731)	0.885
	Healthcare	0.708(0.522—0.959)	0.026	1.112(0.816—1.514)	0.502	1.026(0.777—1.356)	0.854	0.899(0.561—1.443)	0.660

Note: cOR, adjusted odds ratio; CI, confidence interval.

4. Conclusion

This study revealed a high prevalence and heterogeneous nature of mental health problems among tertiary industry workers, with sleep disorders and depressive symptoms being particularly prominent. This finding is highly consistent with the conclusions of numerous previous international studies [15-18]. Regarding gender differences, the structural patterns

observed in this study corroborate international research, with female workers exhibiting a higher risk for depressive symptoms, aligning with global findings on the association between gender inequality and mental health [19]. For instance, European surveys have indicated that female workers commonly face more severe work-family conflicts and career development constraints, which systematically elevate their risk of emotional distress [20]. The relative

“resilience” of men concerning occupational stress may be related to culturally specific norms governing male emotional expression, a phenomenon similarly reported in studies from North America and East Asia [21-22]. The influence of age on mental health also demonstrated differential patterns consistent with international data. This study found that occupational stress peaked between the ages of 30 and 40 years, a finding similar to a multi-country study that attributed this phenomenon to heightened pressures related to career advancement and role responsibilities during this life stage [23]. Concurrently, the 40-50 year age bracket emerged as a high-risk period for depression and anxiety, a trend repeatedly validated in longitudinal studies from Europe, the Americas, and Australia, often interpreted as resulting from a “midlife crisis” and the cumulative burden of multiple social roles [24-25]. Regarding the relationship between socioeconomic factors and mental health, this study identified an association between higher income levels and an increased risk of depression and anxiety, echoing findings from some high-income countries. For example, relevant research has indicated that “effort-reward imbalance” and “over-commitment” are important mechanisms triggering emotional problems in high-paying professional service industries [26-28]. Conversely, higher educational attainment served as a protective factor for mental health, consistent with studies from developing countries and some economies in transition, potentially reflecting the positive role of education in enhancing health literacy and coping resources [29]. Concerning the impact of working hours, this study identified working 45-49 hours per week as a specific risk window for sleep disorders, a finding consistent with reports from the International Labour Organization on the health effects of “long working hours” [30]. In contrast to earlier studies that often focused on extreme overtime (e.g., >55 hours per week), recent international evidence increasingly highlights the erosive effect of moderate but sustained overtime on rest and recovery processes [31-32]. It is noteworthy that night shift work did not show an independent association with mental health outcomes in this study, aligning with some research focused on the service sector. In the tertiary industry, night shifts often co-occur with specific job types, low job control, and other factors, and their psychological effects may be explained by these confounding variables [33-34]. Furthermore, marriage did not demonstrate a universal protective effect in this study and was even associated with sleep disorders. This finding aligns with the trend of a “diminishing protective effect of marriage” observed in some recent studies from East Asia and Northern Europe, possibly reflecting intensified work-family interface pressure in the context of the increasing prevalence of dual-earner families [35].

The innovative aspects of this study were primarily manifested in three dimensions: First, perspective integration. It combined macro-level occupational structural transformation with micro-level individual physical and psychological experiences, revealing the psychosocial dilemmas of workers from a “structural risk” perspective. Second, mechanism specification. It sought to differentiate the specific drivers of distinct mental health problems, advancing the research from correlational analysis towards mechanistic explanation. Third, governance orientation.

Grounded in the local context, it aimed to explore the construction of a “monitoring-intervention-safeguarding” trinity occupational health governance framework, providing a theoretical basis and practical reference for relevant policy formulation. Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal inference; future longitudinal tracking or intervention studies are warranted to establish causality. Second, the data were primarily based on self-reported scales, which may be subject to common method bias. Subsequent studies could employ multi-source data for cross-validation, such as physiological cortisol monitoring or organizational records of absenteeism. Third, the sample did not differentiate between specific job positions or employment types within industries, potentially masking within-group heterogeneity. Future research should further examine organizational-level moderating variables, such as workplace social support and leadership style, and integrate multi-level analyses combining macro-policy contexts with micro-level experiences to develop a more comprehensive explanatory framework.

5. Conclusions

In summary, this study systematically delineated the differentiated mechanisms underlying various mental health problems among tertiary industry workers: occupational stress was primarily associated with job control and role characteristics; depression and anxiety were more profoundly related to socioeconomic status and effort-reward imbalance; and sleep disorders were directly influenced by work schedule arrangements and individual recovery opportunities. Based on these findings, we propose the following multi-level recommendations: At the policy level, labor regulations should be updated to establish a “right to disconnect” framework, with a key focus on limiting weekly working hours to below 45 hours, and family-friendly work policies should be actively promoted. At the organizational level, enterprises need to optimize job design by enhancing employees’ sense of participation and control in decision-making processes. Specifically, in industries such as education and healthcare, administrative procedures should be streamlined and role responsibilities should be clearly defined. At the intervention level, targeted interventions should be implemented based on specific conditions. For depression and anxiety, comprehensive support for middle-aged and older workers, as well as those from socioeconomically disadvantaged backgrounds, should be strengthened. For sleep disorders, boundary management concerning work schedules and sleep health education should be promoted. For occupational stress, emphasis should be placed on role clarification and manager training.

At the research level, further mechanistic investigations and qualitative studies are needed to deeply explore the psychological experiences and coping strategies of high-risk groups, thereby providing an empirical basis for interventions. Improving the mental health of tertiary industry workers necessitates the adoption of systematic, multi-dimensional strategies that integrate institutional safeguards, organizational optimization, and individual support to collectively foster a sustainable and healthy working ecosystem.

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