



Depression and anxiety symptoms among returning workers during the COVID-19 period in East China

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Abstract

Purpose To determine the prevalence of depression and anxiety and associated factors among returning workers with different epidemic experience in East China.

Methods A cross-sectional study was conducted among 2435 employees from the enterprises located in Deqing (low-risk epidemic area) and Taizhou (high-risk epidemic area) of East China in March 2020. An online questionnaire covered information on sociodemographic and lifestyle factors as well as knowledge, attitude, behavior and experience about COVID-19. The Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) were applied to assess depression and anxiety symptoms, respectively. Logistic regression model was used to estimate adjusted odds ratios (aORs) and their 95% confidence intervals (CIs) for depression and anxiety symptoms associated with risk factors.

Results The participants were aged 36.3 ± 9.2 years on average, and nearly half of them were female. Overall, the prevalence of depression, anxiety and both were 19.4%, 12.3% and 9.8%, and decreased with age. After adjustment for covariates, 16 or more years of education, being a white-collar worker or working in the high-risk epidemic area were significantly associated with increased risks of both depression and anxiety, in contrast regular physical exercise was associated with decreased risks of both mental disorders.

Conclusion The depression and anxiety problems were prevalent among returning workers during the COVID-19 period. Targeted psychological interventions should be developed and implemented to improve their mental health.

Keywords COVID-19 · Depression · Anxiety · Returning worker · China

Abbreviations

COVID-19 Coronavirus disease 2019

PHQ-9 Patient Health Questionnaire-9

GAD-7 Generalized Anxiety Disorder-7

OR Odds Ratio

CI Confidence Intervals

WHO World Health Organization

SARS Severe Acute Respiratory Syndrome

DSM-IV Diagnostic and Statistical Manual of Mental Disorder

SD Standard Deviation

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Introduction

World Health Organization (WHO) reported that depression and anxiety ranked in the top 20 causes of the global burden of disease and affected 350 million people worldwide, and that nearly half (49.4%) of the cases were in China in 2015 [1, 2]. The weighted prevalence of mental disorder (excluding dementia) was 16.6% during the lifetime or 9.3% during the past 12 months in China [3]. The ongoing epidemic of coronavirus disease 2019

(COVID-19) substantially increases the risk of mental disorders.

COVID-19, revealed in Wuhan, China in late December 2019, has been widespread throughout the world and declared as a pandemic by the WHO. Until 8th April 2020, the confirmed cases of COVID-19 swiftly raised to 1,317,130, and the confirmed deaths were 74,304, in over 200 countries, areas or territories being affected [4, 5]. Compared to the severe acute respiratory syndrome (SARS) in 2003, the COVID-19 epidemic caused greater anxiety and panic in China, and there was more than one third (35%) of the Chinese adult population who had psychological distress in early February 2020 [6–9]. Most regions in China took various community-based measures to mitigate the spread of COVID-19 [10]. People had been asked to stay home or self-quarantined since middle February 2020, and they might live in areas with low, moderate, or high risk for COVID-19 in China [11]. The COVID-19 epidemic could have a profound mental impact, but the mental health status of employees with a different epidemic experience who return to work had not been well investigated [12–16]. This study aimed to determine the prevalence of depression and anxiety and their influencing factors among returning workers with a different experience of the COVID-19 epidemic in East China.

Methods

Study design and participants

A cross-sectional study was carried out among individuals returning to work in Deqing and Taizhou, the most developed area of Eastern China, from March 5th to 14th, 2020. Deqing was a low-risk area with three confirmed cases of COVID-19 and Taizhou was a high-risk area with 146 confirmed cases until 5th March 2020 [11]. We obtained permission for the study from 120 out of 738 enterprises in Deqing and 43 out of 996 enterprises in Taizhou, respectively. All the selected enterprises had an annual business turnover of 20 million RMB Yuan or more, and only their full-time employees who were older than 17 years and returned to work before mid-February were eligible to participate in this study. A self-administered questionnaire was sent to each individual through the social media and multipurpose application Wechat. Each participant had to complete the survey within 60 min. Those with a completion time of fewer than 2 min or missing important information such as age and sex, were excluded. A total of 2461 questionnaires were collected, and data from 2435 completed questionnaires were analyzed in this study.

Data collection and quality control

An anonymous online questionnaire was designed to collect data through Wechat and covered information on sociodemographic and lifestyle factors; health conditions, knowledge, attitude, and behavior of the COVID-19; and experience related to the COVID-19 [17]. There were age, sex, years of education (< 16/> = 16), annual household income (low/middle/high), white-collar worker (yes/no), alcohol drinking (yes/no), smoking (yes/no), tea drinking (yes/no), regular physical exercise (yes/no), workplace (enterprise/home/both) and enterprise location (Deqing/Taizhou). According to the international standard classification of occupations (ISCO), white-collar workers were legislators, senior officials, managers, (associate) professionals, technicians, and clerks [18]. The annual household income was grouped into three levels: = < 50,000 RMB Yuan as low, 50,001–200,000 RMB Yuan as middle, and > 200,000 RMB Yuan as high in 2019. Alcohol drinking was defined as at least drinking three times per week for at least six months [19]. Smoking was defined as at least one cigarette per day for at least six months [20]. Regular physical exercise was defined as exercising three times or more every week for at least 30 min each time [21]. Quarantine experience was defined as a participant was once quarantined at an assigned site or home for 14 continuous days monitored by local health professionals.

Participants were asked to complete the questionnaire by themselves within a specific range of 2 to 60 min. The questionnaires were directly exported to Excel files.

Measurements of depression and anxiety symptoms

Anxiety and depression symptoms were assessed using the Patient Health Questionnaire-9 (PHQ-9) and the Generalized Anxiety Disorder-7 (GAD-7) scales, respectively. The PHQ-9 scale is a self-administered version of a common mental disorder instrument for depression. The PHQ-9 depression module scores each of the 9 Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) criteria as 0 (not at all) to 3 (nearly every day), and the total score for PHQ-9 range from 0 to 27 (0–4: minimal; 5–9: mild; 10–14: moderate; 15–19: moderate-severe; 20–27: severe) [22]. The GAD-7 scale is commonly used to evaluate anxiety symptoms, which consist of seven items scored from 0 (not at all) to 3 (nearly every day) with a total scale score ranging from 0 to 21 (0–4: minimal; 5–9: mild; 10–14: moderate; 15–21: severe) [23].

In this study, a participant was considered having depression if the PHQ-9 score was 5 or more and having anxiety if the GAD-7 score was 5 or more.

Statistical analysis

Data analysis was performed using R version 3.6.1. Pearson's Chi-square test or Fisher's exact test was applied for categorical variables. Student's *t* test or Wilcoxon test was used for two-group comparisons of normally or non-normally distributed continuous variables, respectively. Logistic regression analysis was used to estimate crude odds ratios (cORs), adjusted odds ratios (aORs) and their 95% confidence intervals (CI) for possible influencing factors related to depression or anxiety. The final models included sex, age groups, years of education, regular physical exercise, white-collar worker, workplace and enterprise location. A two-sided *p* value of 0.05 or less was considered to be statistically significant.

Results

General characteristics of subjects

Of the 2435 participants, about half of them were females. They were aged from 17 to 68 years with an average of 36.3 ± 9.2 years. Compared with Taizhou, Deqing had higher proportions of 16+ years of education, being a white-collar worker, and middle/high annual household income. Most of returning workers worked at the enterprise only, which was more so in Deqing. More than half of the participants worried about the epidemic and the percentage was significantly higher in Taizhou (58.7%) than in Deqing (50.2%). The details were presented in Table 1.

Prevalence of depression and anxiety

The prevalence was 19.4% for depression, 12.3% for anxiety, and 9.8% for having both. The proportions of mild, moderate, moderate-severe, and severe depressive symptoms were 16.5%, 2.1%, 0.6%, and 0.2%, and those of mild, moderate and severe anxiety symptoms 10.7%, 1.0%, and 0.6%, respectively. People with the conditions were significantly younger than those without, and the prevalence decreased with age in both areas. There was a significantly higher prevalence of anxiety in Taizhou than that in Deqing (14.4% vs. 10.9%, $p = 0.012$) but not of depression (21.0% vs. 18.4%, $p = 0.127$). White-collar workers had a higher prevalence of both conditions in Taizhou and only anxiety in Deqing. Tables 2 and 3 present the crude prevalence of depression and anxiety according to various factors and crude odds ratios for their associations.

Table 1 General Characteristics among returning workers during the COVID-19 period between different epidemic risk areas

Characteristics	Deqing (<i>n</i> = 1448)		Taizhou (<i>n</i> = 987)		<i>p</i> value
	<i>n</i>	%	<i>n</i>	%	
Age, years, M (SD) ^a	36.3 (9.3)		36.4 (9.0)		0.993
Sex					0.149
Male	719	49.7	520	52.7	
Female	729	50.3	467	47.3	
Age groups (years) ^a					0.141
17–24	115	8.0	89	9.0	
25–34	600	41.7	376	38.2	
35–44	411	28.6	316	32.1	
45–68	313	21.8	203	20.6	
Years of education					<0.001
< 16 years	1118	77.2	888	90.0	
≥ 16 years	330	22.8	99	10.0	
Annual household income ^b					<0.001
Low	188	16.4	210	25.7	
Middle	753	65.9	512	62.8	
High	202	17.7	93	11.5	
White-collar worker					<0.001
No	355	24.5	349	35.4	
Yes	1093	75.5	638	64.6	
Working place					<0.001
Enterprise	1424	98.3	774	78.4	
Home	7	0.5	184	18.6	
Both	17	1.2	29	3.0	
Smoking					0.739
No	1087	75.1	747	75.7	
Yes	361	24.9	240	24.3	
Alcohol drinking					0.361
No	1326	91.6	914	92.6	
Yes	122	8.4	73	7.4	
Tea drinking					0.025
No	1003	69.3	727	73.7	
Yes	445	30.7	260	26.3	
Regular physical exercise					0.415
No	241	16.6	152	15.4	
Yes	1207	83.4	835	84.6	
Quarantine experience					1.000
No	867	59.9	591	59.9	
Yes	581	40.1	396	40.1	
Positive for the COVID-19 control					0.475
No	419	28.9	299	30.3	
Yes	1029	71.1	688	69.7	
Worrying about the COVID-19 epidemic					<0.001
No	721	49.8	408	41.3	
Yes	727	50.2	579	58.7	
Wearing masks					<0.001
No	22	1.5	46	4.7	
Yes	1426	98.5	941	95.3	

Table 1 (continued)

Characteristics	Deqing (<i>n</i> = 1448)		Taizhou (<i>n</i> = 987)		<i>p</i> value
	<i>n</i>	%	<i>n</i>	%	
Washing hands					0.159
No	5	0.3	8	0.8	
Yes	1443	99.7	979	99.2	
Depression					0.127
No	1181	81.6	780	79.0	
Yes	267	18.4	207	21.0	
Anxiety					0.012
No	1290	89.1	845	85.6	
Yes	158	10.9	142	14.4	

Deqing is defined as low-risk area, and Taizhou as high-risk area. *M* mean, *SD* standard deviation. *p* value < 0.05 means the difference is statistically significant

^a12 missing data

^b477 missing data

Influencing factors related to depression and anxiety

Overall, there were similar associations of influencing factors with depression and with anxiety in two areas as shown in Tables 4 and 5. After adjustment for covariates, higher education was significantly associated with an increased risk for depression in both Deqing (aOR = 1.78, 95% CI 1.31 ~ 2.42, *p* < 0.001) and Taizhou (aOR = 1.83, 95% CI 1.14 ~ 2.91, *p* = 0.012) and for anxiety only in Deqing (aOR = 1.83, 95% CI 1.26 ~ 2.66, *p* < 0.001). Regular physical exercise was associated with decreased risks for both mental disorders in both Deqing (depression: aOR = 0.49, 95% CI = 0.36 ~ 0.69, *p* < 0.001; anxiety: aOR = 0.66, 95% CI 0.45 ~ 1.00, *p* = 0.046) and Taizhou (depression: aOR = 0.65, 95% CI 0.44 ~ 0.97, *p* = 0.034; anxiety: aOR = 0.60, 95% CI 0.39 ~ 0.95, *p* = 0.025). Compared with non-white-collar workers, white-collar workers were significantly more likely to have depression (aOR = 1.40, 95% CI 1.06 ~ 1.87, *p* = 0.020) and anxiety symptoms (aOR = 1.44, 95% CI 1.04 ~ 2.04, *p* = 0.033). Compared with Deqing, Taizhou had higher risks for both mental conditions (depression: aOR = 1.34, 95% CI 1.04 ~ 1.73, *p* = 0.023; anxiety: aOR = 1.61, 95% CI 1.20 ~ 2.17, *p* = 0.002).

Discussion

This study found that more than one-fifth of returning workers had depression (19.4%) or anxiety (12.3%). In the earlier epidemic stage of COVID-19, one study showed a prevalence of 48.3% for depression and 53.3% for anxiety among

the general Chinese adult population [24]. Another study reported that the prevalence of moderate or severe depression and anxiety symptoms were 16.5% and 28.8%, which were substantially higher than our findings (2.9% and 1.6%, respectively) [25]. The reduction of depression and anxiety prevalence was similar, and it is likely because the COVID-19 epidemic was largely under control in the study areas. Furthermore, there might be other reasons for the study discrepancies such as different study populations and measures of mental health. Compared with SARS, the COVID-19 epidemic is more severe, so is the mental health in the general population [26, 27]. Intervention measures should be taken to improve mental health before and after the pandemic.

Previous studies documented that people living in severely infected districts were more likely to have impaired mental wellbeing [24, 28–30]. Compared with Deqing (low-risk area), Taizhou (high-risk area) had a higher prevalence of both depression (21.0% vs. 18.4%) and anxiety symptoms (14.4% vs. 10.9%), and the differences were not likely due to confounding effects. In addition, white-collar workers were significantly more likely to have depression and anxiety, which is consistent with the findings from a previous study, in which higher risks for both mental conditions were found in the high-risk epidemic area [31]. It suggested that white-collar workers should be paid more attention to their mental health, especially in the high-risk epidemic area.

We found that participants who had 16 or more years of education had significantly higher proportions of depression and anxiety symptoms, which was consistent with the finding from previous studies [32]. There is a possibility that participants with higher education tended to pay more attention to the pandemic and were more likely to have a negative influence from media exposure [33]. We also found that regular physical exercise was significantly related to decreased risks of depression and anxiety symptoms, which was similar to the previous findings [34]. Regular physical exercise might reduce the risk of mental disorders during the pandemic.

Limitations and strengths

This study has some limitations. First, this study targeted bigger local enterprises that provided more secure jobs compared with smaller local enterprises and, therefore, the prevalence of depression and anxiety symptoms might be relatively low. Second, the cross-sectional study design provided no evidence for causal relationships between influencing factors and depression or anxiety symptoms. Third, the scales we used did not provide accurate psychological diagnoses of mental disorders. Fourth, both the PHQ-9 and the GAD-7 are basic questionnaires for screening out general depression and anxiety disorders, and more specific questionnaires are needed for the diagnosis of mental disorders

Table 2 The crude prevalence and influencing factors of depression among returning workers during the COVID-19 period in East China

Characteristics	Deqing (<i>n</i> = 1448), <i>n</i> (%)			Taizhou (<i>n</i> = 987), <i>n</i> (%)		
	No (<i>n</i> = 1181)	Yes (<i>n</i> = 267)	cOR95% CI	No (<i>n</i> = 780)	Yes (<i>n</i> = 207)	cOR95% CI
Sex						
Male	584 (80.1)	145 (19.9)	1 (reference)	410 (78.8)	110 (21.2)	1 (reference)
Female	597 (83.0)	122 (17.0)	1.21 (0.93 ~ 1.59)	370 (79.2)	97 (20.8)	0.98 (0.72 ~ 1.33)
Age groups (years)^a						
17–24	85 (73.9)	30 (26.1)	1 (reference)	62 (69.7)	27 (30.3)	1 (reference)
25–34	459 (76.5)	141 (23.5)	0.87 (0.55 ~ 1.37)	279 (74.2)	97 (25.8)	0.80 (0.48 ~ 1.33)
35–44	340 (82.7)	71 (17.3)	0.59 (0.36 ~ 0.96)	259 (82.0)	57 (18.0)	0.51 (0.30 ~ 0.86)
45–68	288 (92.0)	25 (8.0)	0.25 (0.14 ~ 0.44)	177 (87.2)	26 (12.8)	0.34 (0.18 ~ 0.62)
Years of education						
< 16 years	948 (84.8)	170 (15.2)	1 (reference)	717 (80.7)	171 (19.3)	1 (reference)
≥ 16 years	233 (70.6)	97 (29.4)	2.32 (1.74 ~ 3.10)	63 (63.6)	36 (36.4)	2.40 (1.54 ~ 3.73)
Annual household income^b						
Low	161 (85.6)	27 (14.4)	1 (reference)	177 (84.3)	33 (15.7)	1 (reference)
Middle	623 (82.7)	130 (17.3)	1.24 (0.79 ~ 1.95)	404 (78.9)	108 (21.1)	1.16 (0.73 ~ 1.87)
High	157 (77.7)	45 (22.3)	1.71 (1.01 ~ 2.89)	65 (69.9)	28 (30.1)	1.63 (0.85 ~ 3.13)
Smoking						
No	881 (81.0)	206 (19.0)	1 (reference)	604 (80.9)	143 (19.1)	1 (reference)
Yes	300 (83.1)	61 (16.9)	0.87 (0.64 ~ 1.19)	176 (73.3)	64 (26.7)	1.15 (1.09 ~ 2.16)
Alcohol drinking						
No	1077 (81.2)	249 (18.8)	1 (reference)	728 (79.6)	186 (20.4)	1 (reference)
Yes	104 (85.2)	18 (14.8)	0.75(0.45 ~ 1.26)	52 (71.2)	21 (28.8)	1.58 (0.93 ~ 2.69)
Regular physical exercise						
No	168 (69.7)	73 (30.3)	1 (reference)	106 (69.7)	46 (30.3)	1 (reference)
Yes	1013 (83.9)	194 (16.1)	0.44 (0.32 ~ 0.60)	674 (80.7)	161 (19.3)	0.55 (0.37 ~ 0.81)
White-collar worker						
No	304 (85.6)	51 (14.4)	1 (reference)	291 (83.4)	58 (16.6)	1 (reference)
Yes	877(80.2)	216 (19.8)	1.47 (1.05 ~ 2.05)	489 (76.6)	149 (23.4)	1.53 (1.09 ~ 2.14)
Working place						
Enterprise	1163 (81.7)	261 (18.3)	1 (reference)	613 (79.2)	161 (20.8)	1 (reference)
Home	6 (85.7)	1 (14.3)	0.74 (0.09 ~ 6.19)	145 (78.8)	39 (21.2)	1.02 (0.69 ~ 1.52)
Both	12 (70.6)	5 (29.4)	1.86 (0.65 ~ 5.32)	22 (75.9)	7 (24.1)	1.21 (0.51 ~ 2.89)
Quarantine experience						
No	727 (83.9)	140 (16.1)	1 (reference)	466 (78.8)	125 (21.2)	1 (reference)
Yes	454 (78.1)	127 (21.9)	0.69 (0.53 ~ 0.90)	314 (79.3)	82 (20.7)	0.97 (0.71 ~ 1.33)
Positive for the COVID-19 control						
No	333 (79.5)	86 (20.5)	1 (reference)	231 (77.3)	68 (22.7)	1 (reference)
Yes	848 (82.4)	181 (17.6)	0.83 (0.62 ~ 1.10)	549 (79.8)	139 (20.2)	0.86 (0.62 ~ 1.19)
Worrying about the COVID-19 epidemic						
No	607 (84.2)	114 (15.8)	1 (reference)	330 (80.9)	78 (19.1)	1 (reference)
Yes	574 (79.0)	153 (21.0)	1.42 (1.09 ~ 1.86)	450 (77.7)	129 (22.3)	1.21 (0.89 ~ 1.66)

Deqing is defined as low-risk area, and Taizhou as high-risk area

^a12 missing data

^b477 missing data

in the future. Fifth, the questionnaire information was collected via an anonymous online survey, and the quality of such information has not been well investigated. In addition, some unmeasured confounding factors such as previous

psychological experience might have some impact on the observed associations.

Despite these limitations, this study was the first cross-sectional survey on the prevalence of depression

Table 3 The crude prevalence and influencing factors of anxiety among returning workers during the COVID-19 period in East China

Characteristics	Deqing (<i>n</i> = 1448), <i>n</i> (%)			Taizhou (<i>n</i> = 987), <i>n</i> (%)		
	No (<i>n</i> = 1290)	Yes (<i>n</i> = 158)	cOR95% CI	No (<i>n</i> = 845)	Yes (<i>n</i> = 142)	cOR95% CI
Sex						
Male	645 (89.7)	74 (10.3)	1 (reference)	442 (85.0)	78 (15.0)	1 (reference)
Female	645 (89.5)	84 (11.5)	1.14 (0.82 ~ 1.58)	403 (86.3)	64 (13.7)	0.90 (0.63 ~ 1.29)
Age groups (years)^a						
17–24	100 (87.0)	15 (13.0)	1 (reference)	71 (79.8)	18 (20.2)	1 (reference)
25–34	516 (86.0)	84 (14.0)	1.09 (0.60 ~ 1.96)	315 (83.8)	61 (16.2)	0.76 (0.43 ~ 1.37)
35–44	370 (90.0)	41 (10.0)	0.74 (0.39 ~ 1.39)	273 (86.4)	43 (13.6)	0.62 (0.34 ~ 1.14)
45–68	295 (94.2)	18 (5.8)	0.41 (0.20 ~ 0.84)	183 (90.1)	20 (9.9)	0.43 (0.22 ~ 0.86)
Years of education						
< 16 years	1018 (91.1)	100 (8.9)	1 (reference)	764 (86.0)	124 (14.0)	1 (reference)
≥ 16 years	272 (82.4)	58 (17.6)	2.17 (1.53 ~ 3.08)	81 (81.8)	18 (18.2)	1.37 (0.79 ~ 2.36)
Regular physical exercise						
No	203 (84.2)	38 (15.8)	1 (reference)	119 (78.3)	33 (21.7)	1 (reference)
Yes	1087 (90.1)	120 (9.9)	0.59 (0.40 ~ 0.87)	726 (86.9)	109 (13.1)	0.54 (0.35 ~ 0.84)
Annual household income^b						
Low	169 (89.9)	19 (10.1)	1 (reference)	183 (87.1)	27 (12.9)	1 (reference)
Middle	678 (90.0)	75 (10.0)	0.98 (0.58 ~ 1.67)	437 (85.4)	75 (14.6)	1.16 (0.73 ~ 1.87)
High	176 (87.1)	26 (12.9)	1.31 (0.70 ~ 2.46)	75 (80.6)	18 (19.4)	1.63 (0.85 ~ 3.13)
Smoking						
No	972 (89.4)	115 (10.6)	1 (reference)	645 (86.3)	102 (13.7)	1 (reference)
Yes	318 (88.1)	43 (11.9)	1.14 (0.79 ~ 1.66)	200 (83.3)	40 (16.7)	1.26 (0.85 ~ 1.88)
Alcohol drinking						
No	1179 (88.9)	147 (11.1)	1 (reference)	786 (86.0)	128 (14.0)	1 (reference)
Yes	111 (91.0)	11(9.0)	0.79 (0.42 ~ 1.51)	59 (80.8)	14 (19.2)	1.46 (0.79 ~ 2.69)
White-collar worker						
No	320 (90.1)	35 (9.9)	1 (reference)	312 (89.4)	37 (10.6)	1 (reference)
Yes	970 (88.7)	123 (11.3)	1.16 (0.78 ~ 1.72)	533 (83.5)	105 (16.5)	1.66 (1.11 ~ 2.48)
Working place						
Enterprise	1269 (89.1)	155 (10.9)	1 (reference)	661 (85.4)	113 (14.6)	1 (reference)
Home	6 (85.7)	1 (14.3)	1.36 (0.16 ~ 11.41)	160 (87.0)	24 (13.0)	0.88 (0.55 ~ 1.41)
Both	15 (88.2)	2 (11.8)	1.09 (0.25 ~ 4.82)	24 (82.8)	5 (17.2)	1.22 (0.46 ~ 3.26)
Quarantine experience						
No	782 (90.2)	85 (9.8)	1 (reference)	505 (85.4)	86 (14.6)	1 (reference)
Yes	508 (87.4)	73 (12.6)	0.76 (0.54 ~ 1.05)	340 (85.9)	56 (14.1)	0.97 (0.67 ~ 1.39)
Positive for the COVID-19 control						
No	365 (87.1)	54 (12.9)	1 (reference)	250 (83.6)	49 (16.4)	1 (reference)
Yes	925 (89.9)	104 (10.1)	0.76 (0.54 ~ 1.08)	595 (86.5)	93 (13.5)	0.80 (0.55 ~ 1.16)
Worrying about the COVID-19 epidemic						
No	660 (91.5)	61 (8.5)	1 (reference)	366 (89.7)	42 (10.3)	1 (reference)
Yes	630 (86.7)	97 (13.3)	1.67 (1.19 ~ 2.34)	479 (82.7)	100 (17.3)	1.82 (1.24 ~ 2.67)

Deqing is defined as low-risk area, and Taizhou as high-risk area

^a12 missing data

^b477 missing data

and anxiety among returning workers in two study sites with a different epidemic risk for COVID-19, and the response rate was as high as 99%. The survey was anonymous since people might be sensitive to some questions

related to their mental health. The online survey was an efficient method to gather information during the pandemic of COVID-19.

Table 4 The adjusted odds ratio of influencing factors of depression among returning workers during the COVID-19 period in East China

Characteristics	All (n = 2435) aOR95% CI	Deqing (n = 1448) aOR95% CI	Taizhou (n = 987) aOR95% CI
Sex			
Male	1 (reference)	1 (reference)	1 (reference)
Female	1.09 (0.86 ~ 1.38)	1.21 (0.92 ~ 1.60)	1.07 (0.78 ~ 1.47)
Age groups (years)			
17–24	1 (reference)	1 (reference)	1 (reference)
25–34	0.75 (0.48 ~ 1.17)	0.84 (0.53 ~ 1.35)	0.84 (0.50 ~ 1.43)
35–44	0.58 (0.37 ~ 0.92)	0.63 (0.38 ~ 1.05)	0.57 (0.33 ~ 1.00)
45–68	0.32 (0.20 ~ 0.54)	0.31 (0.17 ~ 0.56)	0.40 (0.21 ~ 0.75)
Years of education			
< 16 years	1 (reference)	1 (reference)	1 (reference)
≥ 16 years	1.80 (1.33 ~ 2.41)	1.78 (1.31 ~ 2.42)	1.83 (1.14 ~ 2.91)
Regular physical exercise			
No	1 (reference)	1 (reference)	1 (reference)
Yes	0.49 (0.37 ~ 0.65)	0.49 (0.36 ~ 0.69)	0.65 (0.44 ~ 0.97)
White-collar worker			
No	1 (reference)	1 (reference)	1 (reference)
Yes	1.40 (1.06 ~ 1.87)	1.25 (0.89 ~ 1.79)	1.43 (1.01 ~ 2.04)
Working place			
Enterprise	1 (reference)	1 (reference)	1 (reference)
Home	1.05 (0.66 ~ 1.63)	1.00 (0.05 ~ 6.66)	1.01 (0.65 ~ 1.53)
Both	1.62 (0.72 ~ 3.35)	2.73 (0.82 ~ 7.92)	1.26 (0.48 ~ 2.96)
Enterprise location			
Deqing	1 (reference)	–	–
Taizhou	1.34 (1.04 ~ 1.73)	–	–

Deqing is defined as low-risk area, and Taizhou as high-risk area

Conclusion

The depression and anxiety problems were still prevalent among returning workers after the COVID-19 epidemic was largely controlled but most affected subjects had mild symptoms. Those who were more educated, living in the high-risk epidemic area, white-collar workers and not doing regular physical exercises had higher risks of depression and/or anxiety symptoms. Targeted psychological interventions should be developed and implemented to improve their mental health.

Table 5 The adjusted odds ratio of influencing factors of anxiety among returning workers during the COVID-19 period in East China

Characteristics	All (n = 2435) aOR95% CI	Deqing (n = 1448) aOR95% CI	Taizhou (n = 987) aOR95% CI
Sex			
Male	1 (reference)	1 (reference)	1 (reference)
Female	0.98 (0.74 ~ 1.29)	1.12 (0.80 ~ 1.57)	0.99 (0.68 ~ 1.42)
Age groups (years)			
17–24	1 (reference)	1 (reference)	1 (reference)
25–34	0.76 (0.46 ~ 1.29)	1.05 (0.60 ~ 1.98)	0.78 (0.44 ~ 1.45)
35–44	0.58 (0.35 ~ 1.01)	0.79 (0.43 ~ 1.54)	0.65 (0.35 ~ 1.24)
45–68	0.42 (0.24 ~ 0.75)	0.50 (0.24 ~ 1.06)	0.47 (0.23 ~ 0.97)
Years of education			
< 16 years	1 (reference)	1 (reference)	1 (reference)
≥ 16 years	1.37 (0.95 ~ 1.94)	1.83 (1.26 ~ 2.66)	1.05 (0.58 ~ 1.83)
Regular physical exercise			
No	1 (reference)	1 (reference)	1 (reference)
Yes	0.55 (0.40 ~ 0.78)	0.66 (0.45 ~ 1.00)	0.60 (0.39 ~ 0.95)
White-collar worker			
No	1 (reference)	1 (reference)	1 (reference)
Yes	1.44 (1.04 ~ 2.04)	0.96 (0.64 ~ 1.47)	1.58 (1.06 ~ 2.42)
Working place			
Enterprise	1 (reference)	1 (reference)	1 (reference)
Home	0.88 (0.50 ~ 1.47)	1.64 (0.08 ~ 10.91)	0.95 (0.57 ~ 1.55)
Both	1.33 (0.49 ~ 3.09)	1.36 (0.21 ~ 5.08)	1.41 (0.46 ~ 3.58)
Enterprise location			
Deqing	1 (reference)	–	–
Taizhou	1.61 (1.20 ~ 2.17)	–	–

Deqing is defined as low-risk area, and Taizhou as high-risk area

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Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest to declare.

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