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Psychosocial and coping responses toward 2019 coronavirus diseases (COVID-19): a cross-sectional study within the Chinese general population

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Summary

Background: The 2019 coronavirus diseases (COVID-19) led out the mental health crisis.
Aim: To determine the psychological status and post-traumatic stress symptoms (PTSD) among general population (except confirmed and suspected cases, and close contacts) and their association with the coping strategy types during the COVID-19 outbreak.
Design: A cross-sectional study.
Methods: Participants were recruited from the community through snowball sampling with anonymous online questionnaires, using 28-item General Health Questionnaire, 22-item Impact of Events Scale-Revised and 28-item Brief Coping Inventory to measure their psychiatric disorders, PTSD level and coping strategies.
Results: Of the total 1109 participants, 42.65% and 67.09% self-reported psychiatric disorders and high PTSD level, respectively. Age, occupation and education level were significantly association with psychological status. The status of psychiatric disorders was also significantly related to high PTSD level. Using both emotion and problem coping was better for psychiatric status [adjusted odds ratio (aOR) = 0.72, 95% confidence interval (CI): 0.54–0.98], and problem-focused coping was significantly associated with high PTSD level (aOR = 2.09, 95% CI: 1.25–3.51).
Conclusion: Negative psychological outcomes were common among the general people during the COVID-19 outbreak, and the findings may provide references for intervention guidelines of mental health for the community population.

Introduction

The 2019 coronavirus diseases (COVID-19) is a highly infectious disease with a long incubation period caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2),[1] which has become a significant threat to the global economy and public health. At the same time of physical therapy and management, mental health should not be overlooked, which is crucial for both the patients and the uninfected people. With the implementation of the lockdown policy and quarantine strategy which confines the uninfected population to their home to decrease the risk of disease transmission, the core of human mental health, including social connectedness, daily routines and access to resources could be disrupted,[2] which could then lead to negative psychosocial effects on residents, including post-traumatic stress symptoms (PTSD), confusion and anger.[3,4] An online investigation among the general population found that

during the initial phase of the COVID-19 outbreak in China, 28.8%, 16.5% and 8.1% of respondents were subjected to moderate to severe anxiety, depressive symptoms and stress, respectively.[5] Thus, it is crucial to identify the psychosocial status among the general population to ascertain which subgroups are more likely to be at risk.

Coping refers to the thoughts and acts that individuals use to manage stressful events to reduce the impact of stress.[6] Generally, problem-focused (solving the problem or taking actions to alter the situation) and emotion-focused (reducing the emotional distress associated with the stressful situation) coping are the two main strategies people could use to respond to the outbreak of emerging communicable diseases.[7] Different coping strategies could contribute to different psychological outcomes including emotions and specific strategy could be efficient to certain symptom.[8,9] Therefore, the coping strategies toward this epidemic outbreak should be screened and the adaptive ones should be selected to direct the clinical operation and policy making, to adopt more cost-effective measures to protect the majority, general population, from the adverse psychological outcomes.

Until now, there have been some reports and comments on the psychological impact of the epidemic on medical staff,[10–12] college students[13] and vulnerable groups, such as children,[14,15] adolescents[14,15] and older adults,[16] but the studies focusing on the mental health and coping strategies of the overall general population are few. To help identify the vulnerable people toward psychologic disorders during the period of COVID-19 outbreak and address the optimal coping strategies to guide the population, this study is designed to explore the psychosocial status, coping responses and the risk factors among the uninfected general population, which can provide evidence for policy makers to formulate cost-effective policies and for clinical staff to efficiently implement specific interventions on individuals with different characters.

Materials and methods

Participants

The participants were recruited from the community in mainland China through anonymous online questionnaires in the end of March 2020, using a snowball sampling strategy. Participants were excluded from our sample if they: (i) were under 18 years old, (ii) had been diagnosed with psychiatric disorders before the outbreak; (iii) were confirmed/suspected cases or close contacts. A final sample of 1109 that completed the whole questionnaires were included in the analysis.

Procedure

The online survey was first disseminated to the Chinese residents through an online survey platform ('Jinshuju', Thoughtworks Software Technology Company, Xi'an, China). The participants were encouraged to forward the online survey link to others through Wechat (Tencent, Shenzhen, China), a widely used chat software among Chinese. The questionnaire could be submitted only after they completed all the items, and only once on each mobile device in case of duplicate sample.

Measures

A structured questionnaire was applied in this study to obtain data of demographic information, psychological status, PTSD level and coping strategies. As shown in Table 1, the Cronbach's

Table 1. Reliability analysis of the three scales

Scale	Cronbach's α
28-item General Health Questionnaire (GHQ-28)	0.879
Somatic symptoms	0.836
Anxiety and insomnia	0.828
Social dysfunction	0.854
Severe depression	0.857
Impact of Events Scale-Revised (IES-R)	0.898
Intrusion	0.840
Avoidance	0.875
Hyperarousal	0.851
Brief Coping Inventory (COPE)	0.883
Active coping	0.878
Planning	0.875
Positive reframing	0.878
Acceptance	0.882
Humor	0.876
Religion	0.871
Emotional support seeking	0.873
Instrumental support seeking	0.871
Self-distraction	0.872
Denial	0.873
Venting	0.871
Substance use	0.876
Behavioral disengagement	0.876
Self-blame	0.873

alphas of all the scales and subscales were over 0.8, indicating that the scales utilized in this study were highly reliable among Chinese general population.

Demographic information
The participants were required to provide information about their sex, categorized age, ethnicity, occupation, marital status, education, monthly income and type of medical insurance. They were also asked whether they lived alone and whether they had visited hospitals or fever clinics during the outbreak.

Psychological status
The 28-item General Health Questionnaire (GHQ-28) was used as a screening tool to detect people with psychiatric disorders.[17] It has been well-validated in the Chinese population for determining the extent of psychological impact after exposure to a public health crisis.[5] The scale consists of four subscales (seven items per subscale), including somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. Of the four responses of each item, the responses of worse status than which before the COVID-19 outbreak were scored 1, and the others were scored 0zero. The total score was ranged 0–28, of which 5 and above prompted the individual with psychiatric disorders.[8]

Post-traumatic stress symptoms
The 22-item Impact of Events Scale-Revised (IES-R) was used to examine the PTSD symptoms experienced by the participants during the COVID-19 epidemic period.[18] The scale consists of three subscales, including intrusion (8 items), avoidance (8 items) and hyperarousal (6 items), using a Likert rating scale on a range of 0–4 (never = 0, rarely = 1, sometimes = 2, often = 3, frequently = 4). The total score was ranged 0–88, of which 20 and above indicated high level of PTSD symptoms, as suggested by previous studies.[4,19]

Coping strategies

The 28-item Brief Coping Inventory (COPE) was utilized for assessing the 14 coping strategies (2 items per strategy) people use to cope with the emergency events.[20] The responses of each item were scored 1–4, then the total score (ranged 2–8) of each strategy was calculated, which represented the frequency of participants' use for dealing with COVID-19-related adverse psychological outcomes. Among the strategies shown in Table 1, active coping, planning and instrumental supporting seeking were classified into problem-focused coping, whereas the others into emotion-focused coping. The coping type of each participant was determined by the strategy with the highest score, and the cope type of participants with same highest scores both in emotion-focused and problem-focused group was defined as 'both emotion and problem coping.'

Statistical analysis

Data were analyzed using SPSS version 23.0 (Chicago, IL, USA). For continuous variables, quartiles, maximum and minimum values were calculated and differences among groups were tested by Wilcoxon's/Kruskal–Wallis' tests. For categorical variables, group proportions were calculated, and group differences were tested using χ^2 test or Fisher's exact test. Univariate and multivariate logistic regression analyses were carried out to determine the association between the influence factors of the psychosocial status and PTSD symptoms. Covariates entered in the multiple models included sex (male vs. female), age (categorized by '18–29 years', '30–39 years', '40–49 years', '50–59 years' and '≥60 years'), ethnicity (Han vs. minority), occupation (labor, service staff, company employee, public institutions staff, students, professional and technical staffs, retired/housewife and others), marital status (single, married and divorced/widowed), education (less than junior high school, senior high school, undergraduate/college and graduate), monthly income (categorized by '<3000', '3000–4999', '5000–9999', '≥10 000'), type of medical insurance (basic insurance for urban employees, basic insurance for urban and rural residents, commercial insurance and none), living arrangements (lives alone or with others), the experience of visiting hospitals and fever clinics (yes or no), ISE-R or GHQ-28 scores (total scores and subscale scores), psychological status/PTSD level and the type of coping (problem-focused, emotion-focused and both). The odds ratio (OR) and adjusted odds ratios (aORs), as well as the 95% confidence interval (95% CI), were reported in the final multivariate regression model. A two-tailed P value of ≤0.05 was considered statistically significant.

Results

Demographic characteristics

As shown in Table 2, of the total 1109 participants who completed the questionnaire, 622 (56.09%) were males, 917 (82.68%) were between 18 and 39 years, 1059 (95.49%) were ethnic Han, 887 (79.98%) completed university/college education or higher, and most (95.04%) have medical insurance. For the living arrangement and medical exposure during the outbreak, 347 (31.29%) of the respondents reported living alone, 49 (4.42%) had visited hospitals and 16 (1.44%) had visited the fever clinics.

Coping strategy

Overall, toward the COVID-19 outbreak, 127 (11.45%) of the respondents used problem-focused coping, 569 (51.31%) used emotion-focused coping and 413 (37.24%) used both emotion and problem coping. The type of medical insurance was significant associated with the type of coping ($\chi^2 = 15.35$, P = 0.018). No significant differences were found among the three coping groups in the other demographic characteristics.

Psychological status and coping

The median (first quartile and third quartile) of GHQ-28 total score, and the subscales scores of somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression were 3.0 (1.0, 10.0), 1.0 (0.0, 2.0), 0.0 (0.0, 3.0), 1.0 (0.0, 3.0) and 0.0 (0.0, 2.0), respectively. Of the 1109 participants, 473 (42.65%) reported psychiatric disorders, with GHQ-28 scale scored 5 or more. As shown in Table 3, for the multivariate analysis, people who used both emotion and problem coping were at better psychological status than those using emotion-focused coping (aOR = 0.72, 95% CI: 0.54–0.98). In addition, people aged 30–39 years (aOR = 1.78, 95% CI: 1.15–2.78) and 40–49 years (aOR = 2.45, 95% CI: 1.41–4.27) were at higher risk psychiatric disorders toward this outbreak, compared with those under 30. Students (aOR = 2.57, 95% CI: 1.14–5.80) and professional and technical staffs (aOR = 2.17, 95% CI: 1.15–2.78) were also at higher risk, compared with labors. Lower education level and higher PTSD level were also significantly associated with higher risk of psychiatric disorders.

PTSD level and coping

The median (first quartile and third quartile) of IES-R total score, and the subscales scores of intrusion, avoidance and hyperarousal were 26.0 (16.0, 36.0), 9.0 (6.0, 13.0), 10.0 (6.0, 14.0) and 6.0 (3.0, 10.0), respectively. Of the 1109 participants, 744 (67.09%) were in high PTSD level, with IES-R scale scored 20 or more. As shown in Table 4, for the multivariate analysis, people who used problem-focused coping were at higher risk of high PTSD level than those using emotion-focused coping (aOR = 2.09, 95% CI: 1.25–3.51) and as stated above, psychiatric disorder was significantly associated with higher PTSD level (aOR = 10.69, 95% CI: 7.39–15.45).

Discussion

In this study, 42.65% and 67.09% of the participants self-reported psychiatric disorders and a high level of PTSD, respectively. The Chinese residents has been suffering from the negative emotions after the government officially implemented acute interventions toward COVID-19, as a B-type infectious disease.[21] At the initial stage of the epidemic during 31 January to 2 February in China, high prevalence of adverse mental outcome was reported, such as depression (48.3%, 95% CI: 46.9–49.7%), anxiety (22.6%, 95% CI: 21.4–23.8%) and combination of depression and anxiety (19.4%, 95% CI: 80.9–83.1%).[5] This may due to the specific epidemic patterns and strict management policy for prevention. For example, the uncertain incubation period of the virus and its possible asymptomatic transmission may cause additional fear and anxiety.[13,22] Besides, although the amount of current confirmed cases was continually decreasing in China during the study period of late March 2020,[23] COVID-19 became a pandemic on 11 March,[24] so it is reasonable that the negative emotions continued.

In this study, adults aged 30–49 years among the general population were at higher risk of psychiatric disorders, which was not consistent with other studies of COVID-19[5,25] and 2003

Table 2. Demographic characteristics and coping strategy type of the 1109 general Chinese population during 2019 coronavirus diseases, *n* (%)

Demographic	Total (*n* = 1109)	Problem-focused (*n* = 127)	Emotion-focused (*n* = 569)	Both emotion and problem (*n* = 413)
Sex				
Male	622 (56.09%)	80 (62.99%)	316 (55.54%)	226 (54.72%)
Female	487 (43.91%)	47 (37.01%)	253 (44.46%)	187 (45.28%)
Age (years)				
18–29	487 (43.91%)	54 (42.52%)	260 (45.69%)	173 (41.89%)
30–39	430 (38.77%)	40 (31.50%)	223 (39.19%)	167 (40.44%)
40–49	148 (13.35%)	26 (20.47%)	70 (12.30%)	52 (12.59%)
50–59	34 (3.07%)	5 (3.94%)	14 (2.46%)	15 (3.63%)
≥60	10 (0.90%)	2 (1.57%)	2 (0.35%)	6 (1.45%)
Ethnic				
Han	1059 (95.49%)	124 (97.64%)	543 (95.43%)	392 (94.92%)
Minority	50 (4.51%)	3 (2.36%)	26 (4.57%)	21 (5.08%)
Occupation				
Labor	64 (5.77%)	9 (7.09%)	28 (4.92%)	27 (6.54%)
Service staff	85 (7.66%)	9 (7.09%)	43 (7.56%)	33 (7.99%)
Company employee	293 (26.42%)	39 (30.71%)	146 (25.66%)	108 (26.15%)
Public institutions staff	104 (9.38%)	12 (9.45%)	51 (8.96%)	41 (9.93%)
Students	218 (19.66%)	24 (18.9%)	125 (21.97%)	69 (16.71%)
Professional and technical staff	219 (19.75%)	20 (15.75%)	112 (19.68%)	87 (21.07%)
Retired/housewife	38 (3.43%)	4 (3.15%)	24 (4.22%)	10 (2.42%)
Others	88 (7.94%)	10 (7.87%)	40 (7.03%)	38 (9.2%)
Marital status				
Single	476 (42.92%)	54 (42.52%)	250 (43.94%)	172 (41.65%)
Married	607 (54.73%)	68 (53.54%)	307 (53.95%)	232 (56.17%)
Divorced/widowed	26 (2.34%)	5 (3.94%)	12 (2.11%)	9 (2.18%)
Education				
Less than junior high school	52 (4.69%)	9 (7.09%)	27 (4.75%)	16 (3.87%)
Senior high school	170 (15.33%)	22 (17.32%)	82 (14.41%)	66 (15.98%)
Undergraduate/college	830 (74.84%)	88 (69.29%)	433 (76.1%)	309 (74.82%)
Graduate	57 (5.14%)	8 (6.3%)	27 (4.75%)	22 (5.33%)
Monthly income (yuan)				
<3000	287 (25.88%)	31 (24.41%)	159 (27.94%)	97 (23.49%)
3000–4999	268 (24.17%)	31 (24.41%)	124 (21.79%)	113 (27.36%)
5000–9999	406 (36.61%)	47 (37.01%)	217 (38.14%)	142 (34.38%)
≥10 000	148 (13.35%)	18 (14.17%)	69 (12.13%)	61 (14.77%)
Medical insurance				
Basic insurance for urban employees	459 (41.39%)	56 (44.09%)	214 (37.61%)	189 (45.76%)
Basic insurance for urban and rural residents	544 (49.05%)	54 (42.52%)	305 (53.6%)	185 (44.79%)
Commercial insurance	51 (4.60%)	5 (3.94%)	25 (4.39%)	21 (5.08%)
None	55 (4.96%)	12 (9.45%)	25 (4.39%)	18 (4.36%)
Living arrangements				
Live alone	347 (31.29%)	40 (31.50%)	179 (31.46%)	128 (30.99%)
Live with others	762 (68.71%)	87 (68.5%)	390 (68.54%)	285 (69.01%)
Hospital visits				
Yes	49 (4.42%)	5 (3.94%)	25 (4.39%)	19 (4.6%)
No	1060 (95.58%)	122 (96.06%)	544 (95.61%)	394 (95.4%)
Fever clinics visits				
Yes	16 (1.44%)	3 (2.36%)	7 (1.23%)	6 (1.45%)
No	1093 (98.56%)	124 (97.64%)	562 (98.77%)	407 (98.55%)

severe acute respiratory syndrome (SARS) outbreak.[8,26] It informed that not only the commonly vulnerable group including children and the elderly should be focused, others in their 30s and 40s were also worthy of more attention. On the one hand, they were facing challenges on their career, such as unemployment and decreased salary. Due to the lockdown policy and significantly decreased social activities, the corporate bankruptcy might happen to some small-scale enterprises. According to the government report, the unemployment rate in February 2020 increased from 0.9% to 6.2%[27] and the government then developed policies to regulate the rate. On the other hand, their family responsibility of feeding families and

Table 3. Univariable and multivariable models examining coping and psychological status during the outbreak of 2019 coronavirus diseases, adjusted by demographic characteristics and PTSD

Variables	GHQ-28≥5 (n = 473)	GHQ-28<5 (n = 636)	Univariate analysis OR (95% CI)	Multivariate analysis aOR (95% CI)
Sex, *n* (%)				
Male	279 (58.99%)	343 (53.93%)	Reference	Reference
Female	194 (41.01%)	293 (46.07%)	0.81 (0.64–1.04)	0.85 (0.64–1.14)
Age (years), *n* (%)				
18–29	169 (35.73%)	318 (50.00%)	Reference	Reference
30–39	199 (42.07%)	231 (36.32%)	**1.62 (1.24–2.12)**	**1.78 (1.15–2.78)**
40–49	83 (17.55%)	65 (10.22%)	**2.40 (1.65–3.49)**	**2.45 (1.41–4.27)**
50–59	19 (4.02%)	15 (2.36%)	**2.38 (1.18–4.81)**	2.34 (0.93–5.87)
≥60	3 (0.63%)	7 (1.10%)	0.81 (0.21–3.16)	1.02 (0.19–5.43)
Ethnic, *n* (%)				
Han	457 (96.62%)	602 (94.65%)	Reference	Reference
Minority	16 (3.38%)	34 (5.35%)	0.62 (0.34–1.14)	0.97 (0.47–1.99)
Occupation, *n* (%)				
Labor	22 (4.65%)	42 (6.60%)	Reference	Reference
Service staff	43 (9.09%)	42 (6.60%)	**1.96 (1.00–3.81)**	2.10 (0.98–4.52)
Company employee	124 (26.22%)	169 (26.57%)	1.4 (0.80–2.47)	1.65 (0.86–3.20)
Public institutions staff	36 (7.61%)	68 (10.69%)	1.01 (0.53–1.95)	1.32 (0.62–2.82)
Students	79 (16.70%)	139 (21.86%)	1.08 (0.60–1.95)	**2.57 (1.14–5.80)**
Professional and technical staff	111 (23.47%)	108 (16.98%)	**1.96 (1.10–3.50)**	**2.17 (1.11–4.23)**
Retired/housewife	16 (3.38%)	22 (3.46%)	1.39 (0.61–3.17)	1.42 (0.49–4.11)
Others	42 (8.88%)	46 (7.23%)	1.74 (0.90–3.39)	1.92 (0.89–4.13)
Marital status, *n* (%)				
Single	179 (37.84%)	297 (46.70%)	Reference	Reference
Married	279 (58.99%)	328 (51.57%)	**1.41 (1.11–1.80)**	0.93 (0.60–1.44)
Divorced/widowed	15 (3.17%)	11 (1.73%)	**2.26 (1.02–5.04)**	0.79 (0.29–2.15)
Education, *n* (%)				
Less than junior high school	28 (5.92%)	24 (3.77%)	Reference	Reference
Senior high school	63 (13.32%)	107 (16.82%)	**0.51 (0.27–0.95)**	**0.34 (0.16–0.75)**
Undergraduate/college	365 (77.17%)	465 (73.11%)	0.67 (0.38–1.18)	0.52 (0.25–1.08)
Graduate	17 (3.59%)	40 (6.29%)	**0.36 (0.17–0.80)**	**0.35 (0.13–0.93)**
Monthly income (yuan), *n* (%)				
<3000	110 (23.26%)	177 (27.83%)	Reference	Reference
3000–4999	121 (25.58%)	147 (23.11%)	1.32 (0.94–1.86)	0.94 (0.56–1.57)
5000–9999	177 (37.42%)	229 (36.01%)	1.24 (0.91–1.69)	0.71 (0.42–1.21)
≥10 000	65 (13.74%)	83 (13.05%)	1.26 (0.84–1.89)	0.80 (0.44–1.47)
Medical insurance, *n* (%)				
Basic insurance for urban employees	218 (46.09%)	241 (37.89%)	Reference	Reference
Basic insurance for urban and rural residents	208 (43.97%)	336 (52.83%)	**0.68 (0.53–0.88)**	0.72 (0.52–1.00)
Commercial insurance	29 (6.13%)	22 (3.46%)	1.46 (0.81–2.61)	1.68 (0.85–3.35)
None	18 (3.81%)	37 (5.82%)	**0.54 (0.30–0.97)**	0.72 (0.34–1.54)
Living arrangements, *n* (%)				
Live alone	162 (34.25%)	185 (29.09%)	Reference	Reference
Live with others	311 (65.75%)	451 (70.91%)	0.79 (0.61–1.02)	0.82 (0.60–1.12)
Hospital visits, *n* (%)				
Yes	24 (5.07%)	25 (3.93%)	Reference	Reference
No	449 (94.93%)	611 (96.07%)	0.77 (0.43–1.36)	0.84 (0.43–1.64)
Fever clinics visits, *n* (%)				
Yes	11 (2.33%)	5 (0.79%)	Reference	Reference
No	462 (97.67%)	631 (99.21%)	**0.33 (0.12–0.96)**	0.43 (0.12–1.53)
IES-R score, *n* (%)				
<20	41 (8.67%)	324 (50.94%)	Reference	Reference
≥20	432 (91.33%)	312 (49.06%)	**10.94 (7.66–15.62)**	**10.91 (7.53–15.83)**
IES-R total score, M (Q_1, Q_3)	36.0 (28.0, 44.0)	19.0 (10.75, 27.0)	**1.12 (1.11–1.14)**	–
Intrusion	13.0 (10.0, 16.0)	7.0 (4.0, 10.0)	**1.29 (1.25–1.34)**	
Avoidance	13.0 (10.0, 16.0)	7.0 (4.0, 11.0)	**1.22 (1.19–1.26)**	
Hyperarousal	10.0 (7.0, 13.0)	4.0 (2.0, 7.0)	**1.47 (1.41–1.54)**	
Coping strategy, *n* (%)				
Emotion-focused	256 (54.12%)	313 (49.21%)	Reference	Reference
Problem-focused	59 (12.47%)	68 (10.69%)	1.06 (0.72–1.56)	0.78 (0.50–1.21)
Both emotion and problem	158 (33.40%)	255 (40.09%)	**0.76 (0.59–0.98)**	**0.72 (0.54–0.98)**

Statistically significant values are shown in bold.

M, median; Q_1, 1st quartile; Q_3, 3rd quartile; OR, odds ratio; aOR, adjusted odds ratio in the multivariate model; GHQ-28, 28-item General Health Questionnaire scale; IES-R, 22-item Impact of Events Scale-Revised scale.

Table 4. Univariable and multivariable models examining coping and PTSD during the outbreak of 2019 coronavirus diseases, adjusted by demographic characteristics and psychological status

Variables	IES-R≥20 (n = 744)	IES-R<20 (n = 365)	Univariate analysis OR (95% CI)	Multivariate analysis aOR (95% CI)
Sex, *n* (%)				
Male	432 (58.06%)	190 (52.05%)	Reference	Reference
Female	312 (41.94%)	175 (47.95%)	0.78 (0.61–1.01)	0.88 (0.65–1.19)
Age (years), *n* (%)				
18–29	293 (39.38%)	194 (53.15%)	Reference	Reference
30–39	303 (40.73%)	127 (34.79%)	**1.58 (1.20–2.08)**	1.07 (0.68–1.67)
40–49	114 (15.32%)	34 (9.32%)	**2.22 (1.45–3.39)**	1.30 (0.71–2.36)
50–59	27 (3.63%)	7 (1.92%)	**2.55 (1.09–5.98)**	1.55 (0.54–4.46)
≥60	7 (0.94%)	3 (0.82%)	1.54 (0.40–6.05)	1.51 (0.28–8.08)
Ethnic, *n* (%)				
Han	720 (96.77%)	339 (92.88%)	Reference	Reference
Minority	24 (3.23%)	26 (7.12%)	**0.43 (0.25–0.77)**	0.57 (0.28–1.14)
Occupation, *n* (%)				
Labor	42 (5.65%)	22 (6.03%)	Reference	Reference
Service staff	65 (8.74%)	20 (5.48%)	1.70 (0.83–3.49)	1.41 (0.63–3.14)
Company employee	204 (27.42%)	89 (24.38%)	1.20 (0.68–2.13)	1.04 (0.54–1.99)
Public institutions staff	63 (8.47%)	41 (11.23%)	0.81 (0.42–1.54)	0.74 (0.35–1.55)
Students	118 (15.86%)	100 (27.40%)	0.62 (0.35–1.10)	0.63 (0.27–1.47)
Professional and technical staff	159 (21.37%)	60 (16.44%)	1.39 (0.77–2.52)	1.02 (0.52–2.00)
Retired/housewife	26 (3.49%)	12 (3.29%)	1.14 (0.48–2.67)	0.98 (0.33–2.94)
Others	67 (9.01%)	21 (5.75%)	1.67 (0.82–3.40)	1.64 (0.73–3.67)
Marital status, *n* (%)				
Single	294 (39.52%)	182 (49.86%)	Reference	Reference
Married	428 (57.53%)	179 (49.04%)	**1.48 (1.15–1.91)**	0.88 (0.56–1.38)
Divorced/widowed	22 (2.96%)	4 (1.10%)	**3.4 (1.16–10.04)**	1.9 (0.52–6.93)
Education, *n* (%)				
Less than junior high school	33 (4.44%)	19 (5.21%)	Reference	Reference
Senior high school	112 (15.05%)	58 (15.89%)	1.11 (0.58–2.12)	1.65 (0.73–3.74)
Undergraduate/college	568 (76.34%)	262 (71.78%)	1.25 (0.70–2.24)	1.81 (0.83–3.93)
Graduate	31 (4.17%)	26 (7.12%)	0.69 (0.32–1.48)	1.31 (0.48–3.52)
Monthly income (yuan), *n* (%)				
<3000	167 (22.45%)	120 (32.88%)	Reference	Reference
3000–4999	187 (25.13%)	81 (22.19%)	**1.66 (1.17–2.36)**	0.95 (0.54–1.69)
5000–9999	290 (38.98%)	116 (31.78%)	**1.80 (1.31–2.47)**	1.07 (0.59–1.93)
≥10 000	100 (13.44%)	48 (13.15%)	1.50 (0.99–2.27)	0.93 (0.47–1.81)
Medical insurance, *n* (%)				
Basic insurance for urban employees	335 (45.03%)	124 (33.97%)	Reference	Reference
Basic insurance for urban and rural residents	346 (46.51%)	198 (54.25%)	**0.65 (0.49–0.85)**	0.89 (0.63–1.26)
Commercial insurance	37 (4.97%)	14 (3.84%)	0.98 (0.51–1.87)	0.85 (0.39–1.86)
None	26 (3.49%)	29 (7.95%)	**0.33 (0.19–0.59)**	**0.42 (0.20–0.88)**
Living arrangements, *n* (%)				
Live alone	241 (32.39%)	106 (29.04%)	Reference	Reference
Live with others	503 (67.61%)	259 (70.96%)	0.85 (0.65–1.12)	1.10 (0.78–1.53)
Hospital visits, *n* (%)				
Yes	35 (4.70%)	14 (3.84%)	Reference	Reference
No	709 (95.30%)	351 (96.16%)	0.81 (0.43–1.52)	0.80 (0.37–1.72)
Fever clinics visits, *n* (%)				
Yes	12 (1.61%)	4 (1.10%)	Reference	Reference
No	732 (98.39%)	361 (98.90%)	0.68 (0.22–2.11)	1.65 (0.40–6.74)
GHQ-28 score, *n* (%)				
<5	312 (41.94%)	324 (88.77%)	Reference	Reference
≥5	432 (58.06%)	41 (11.23%)	**10.94 (7.66–15.62)**	**10.69 (7.39–15.45)**
GHQ-28 total score, M (Q_1, Q_3)	6.0 (2.0, 13.0)	1.0 (0.0, 2.0)	**1.32 (1.26–1.37)**	–
Somatic symptoms	1.0 (0.0, 3.0)	0.0 (0.0, 0.0)	**2.40 (2.06–2.79)**	
Anxiety and insomnia	2.0 (0.0, 4.0)	0.0 (0.0, 0.0)	**2.14 (1.87–2.44)**	
Social dysfunction	2.0 (0.0, 3.0)	0.0 (0.0, 1.0)	**1.85 (1.66–2.07)**	
Severe depression	1.0 (0.0, 3.0)	0.0 (0.0, 0.0)	**1.78 (1.57–2.01)**	
Coping strategy, *n* (%)				
Emotion-focused	380 (51.08%)	189 (51.78%)	Reference	Reference
Problem-focused	100 (13.44%)	27 (7.40%)	**1.84 (1.16–2.92)**	**2.09 (1.25–3.51)**
Both emotion and problem	264 (35.48%)	149 (40.82%)	0.88 (0.68–1.15)	0.95 (0.70–1.29)

Statistically significant values are shown in bold.

M, median; Q_1, 1st quartile; Q_3, 3rd quartile; OR, odds ratio; aOR, adjusted odds ratio in the multivariate model; GHQ-28, 28-item General Health Questionnaire scale; IES-R, 22-item Impact of Events Scale-Revised scale.

protecting them from the diseases during the outbreak would lead to more worries and stress.

Students and professional and technical staffs were also observed with higher risk of psychiatric disorders, compared with labors. A study confirmed that the anxiety of the college students increased with the worry about academic delays caused by the lockdown policy.[13] First, they were not allowed to go back to their laboratory to complete their experiment in need of long-term observation and operation, which was also a concern for some professors and technical staff. The disrupted time plan would influence the outcome of their study and then the graduation of the students and the academic achievements of the staff. Second, students were facing more difficulties of employment because of the decreasing required positions in enterprises and the uncertain time of graduation. Toward this situation, the government developed several policies from late March to help graduates pursue higher degree and obtain employment by expanding the enrollment of universities, academic institutes, state-owned enterprises and government.[28,29]

Lower education level was significantly associated with higher risk of psychiatric disorders. Similar results were found in other research, such as higher risk of depression during the COVID-19 outbreak[5,30] and higher risk of distress during SARS outbreak.[26] The gross enrollment rate of senior high school was 89.5% in 2019 in mainland China,[31] so there were still many people whose mental health should be paid more attention to when emerging infectious epidemic or other nature disaster occurred.

The negative emotions and psychological status should be regulated timely. First, the generalized fear and fear-induced over-reactive behavior among the public can impede the infection control.[32] For example, under the pressure of fear and anxiety, people will choose to flee from high-incidence communities or migrating to new settings for their fear of infection and illness, stigma and disclosure toward infectious status of familiar individuals, which will considerably increase the risk of disease transmission. Second, the impact was adverse for health and could last for years. A long-term cohort study showed that even at 30 months after SARS outbreak, there were still 25.6% and 15.6% of the survivors reported PTSD and depressive disorders.[33] Therefore, choosing appropriate means to coping with the epidemic seems crucial to the public.

Both emotion-focused and problem-focused coping were reported to effectively reduce negative emotions, including anger and sadness, during the epidemic outbreak in the previous studies.[9] In this study, participants using emotion-focused coping reported higher psychiatric morbidity than those using both emotion and problem coping strategies, in consistent with a previous study in Singapore that people with psychiatric disorders were more likely to use self-blame strategy (aOR = 1.67, 95% CI: 1.22–2.28).[8] It noted that both emotion-focused and problem-focused coping strategies were important and should be used at the same time to cope with potential negative mental health outcomes during COVID-19. For PTSD, findings in this study revealed that problem-focused coping strategies were better for prevention than emotion-focused, whereas both denial (aOR = 1.31, 95% CI: 1.04–1.67) and planning (aOR = 1.51, 95% CI: 1.16–1.95) strategies were significantly associated with the risk of PTSD during SARS outbreak.[8] Although there was some research about coping responses toward epidemic outbreaks in the general population,[34] various scales were used and few studies measured the responses with COPE scale, so that it is difficult to pool and evaluate the conclusions. More studies focusing on the coping strategies using same measure tools should be conducted in the future to confirm the effective strategies toward several negative psychological outcomes and to provide evidence for future guideline of mental health intervention. Moreover, it should be considered that the effect of the same strategy may vary at different period of the outbreak. The findings in this study could be the evidence at one point of the outbreak and evaluation of strategy effect at other points were still needed.

This study has several limitations. First, due to the limitation of social interpersonal activities, participants in this study were recruited by non-random snowball sampling strategy, but not random sampling, which may produce some selection bias and cause a relatively higher prevalence rate. Second, because the target population of this study was general population, the results should not be generalized to the entire population including the confirmed and suspected cases, and close contacts, as well as children and adolescents who were under 18 years. Lastly, possible socially desirable responding could result in bias toward psychiatric morbidity. The participants might choose not to disclose their symptoms to keep themselves in a 'healthy' status.

Despite of the limitations, this study measured the psychological status of the general population nearly 2 months after the lockdown policy was implemented in mainland of China, which supplement the current evidence of mental health.[30] The findings in this study could be combined with previous and future studies to compare the mental status at different periods during and after the outbreak and assess the change to guide the standard intervention for mental health to prepare for future potential epidemic outbreak. Finally, problem-focused coping strategies were found to be more effective than emotion-focused ones for PTSD and both emotion and problem coping were better for psychiatric disorders, which prompted specific strategies toward specific symptoms to improve the existing guidelines of mental health for general population during COVID-19 outbreak.

Conclusion

In conclusion, this study reported high prevalence of psychiatric disorders and high-level PTSD. Age, occupation and education level were significantly association with psychological status. It was speculated that using both emotion and problem coping was better for preventing psychiatric disorders, and using emotion-focused coping was better for controlling PTSD. Further studies are needed to extend the findings at the other period of COVID-19 and to confirm effective specific strategies to deal with negative psychological outcomes.

Conflict of interest. None declared.

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