

Prevalence of PTSD Symptoms Among Psychiatric Patients During the COVID-19 Pandemic

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Research

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Abstract

Background: The outbreak of the COVID-19 pandemic has caused extensive public health concern and posed great challenges to the medical services, including the mental health concern for psychiatric patients who were one of neglected groups. The current study aimed to assess the prevalence and risk factors of post-traumatic stress disorder (PTSD) symptoms among psychiatric patients in China during the pandemic.

Method: Self-reported questionnaires were distributed to psychiatric patients in several psychiatric hospitals in Beijing China from 28 April to 30 May 2020. The socio-demographic information and psychiatric symptoms such as PTSD, anxiety and depressive symptoms were collected by using The Impact of Event Scale- Revised (IES-R), the 7-item Generalized Anxiety Disorder Scale (GAD-7) and the 9-item Patient Health Questionnaire depression scale (PHQ-9). Multivariate regression was used to analysis the related factors for PTSD symptoms.

Results: 1,055 psychiatric patients were included in the final sample. The prevalence of PTSD symptoms was 41.3%. Risk factors for PTSD symptoms and its subscales included old age, high risk perception, symptoms of anxiety, symptoms of depression.

Conclusions: The prevalence of PTSD symptoms is high among psychiatric patients during the COVID-19 pandemic in China. We call for more concern and PTSD interventions to relieve the psychological stress of psychiatric patients during the pandemic.

Introduction

The COVID-19 pandemic has made huge impact around the whole world in many aspects, including physical and mental health among public [1]. Psychotic symptoms were increasing among general population and infected patients during the pandemic [2–4]. Many people show numbness, stiffness, high vigilance and other psychotic symptoms in face of the pandemic [5].

The epidemiological survey showed that the prevalence of mental disorders among adults in four provinces in China was 17.5% [6]. Several researchers and experts stated that the COVID-19 pandemic might have an even more bad effect on individuals with pre-existing mental disorders [7–10]. Some surveys conducted in China among the general population after COVID-19 outbreak reported moderate to severe anxiety and depressive symptoms in general population (16.5%-35.1%) [11]. As a special and often neglected group, psychiatric patients also have showed some mental health problems during the pandemic, even they were not infected by COVID-19[10]. Psychiatry patients diagnosed as severe mental illnesses, including affective disorders and schizophrenia spectrum illnesses were at much higher risk for negative outcomes in mental health related to the pandemic [12].

PTSD is caused after exposure to one or more traumatic events [13]. Characteristic symptoms include three subscale types: intrusion (including intrusive thoughts, intrusive feelings and imagery, nightmares, dissociative-like re-experiencing), avoidance (including numbing of responsiveness, avoidance of situations, feelings, and ideas), and hyperarousal (including irritability, anger, difficulty concentrating, hypervigilance, heightened startle) [14]. Prolonged exposure to stress can accelerate disease progression and worsen chronic health conditions, increasing health care costs and economic burdens [5]. We assume that the prevalence of PTSD symptoms among psychiatric patients is high due to their susceptibility and vulnerability to crisis [8, 9]. This study aims to examine the prevalence of PTSD symptoms among psychiatric patients during the COVID-19, and investigate the risk and protective factors of PTSD symptoms and its subscale symptoms.

Methods

Study participants

A cross-sectional survey was conducted from May 4 to June 30, 2020. Cluster sampling was used to construct the sample. The questionnaire was distributed to each inpatient and outpatient of several psychiatric hospitals in Beijing by three psychiatrists. The inclusion criteria was: (1) able to write (2) age from 18 to 60 year old. (3) were not infected by COVID-19 and family members were not infected by COVID-19. Participants were informed of the purpose and procedure of the study before participating the survey. They were also informed that they could refuse to answer any questions or withdraw at any time during the study. The informed consent was signed by each participants before they completed the survey. 1,094 participants completed the survey, with a response rate of 99%. In the analysis 39 participants were excluded due to incomplete information, making the final sample size is 1,055.

Measures

Socio-demographic characteristics

Socio-demographic characteristics were collected, including sex, age, education level, marital status, employment status, family annual income, residence place, residence status during the pandemic were recorded. Information about diagnosis of mental disorder, medication status during pandemic, risk awareness, and effects of COVID-19 on original mental disease (Clinical treatment during pandemic, Mental health guidance during pandemic, Medication barriers due to pandemic) were also collected.

PTSD symptoms

PTSD symptoms was measured by The Impact of Event Scale- Revised (IES-R). It's a 22-item self-reported scale, it assesses subjective distress caused by traumatic events. The question items were categorized into three subscales: intrusion, avoidance and hyperarousal, and were rated on a 5-point scale ranging from 0 to 4 (0 = *not at all*, 4 = *extremely*), and IES-R was validated for research in health-related trauma such as SARS

[15, 16] and has demonstrated sound validity in China [17]. While there is no specific cut-off score, the IES-R is not used to be diagnostic. In this study with scores equal or higher than 24 was of clinical concern according to previous research [14]. We calculated the composite score for PTSD (Cronbach's $\alpha = 0.93$) and its subscales (Cronbach's $\alpha = 0.84 \sim 0.84$).

Psychosomatics factors

Anxiety was assessed with the Generalized Anxiety Disorder Scale (GAD-7), it is used to measure the frequency of anxiety symptoms in the past two weeks. GAD-7 is on a scale ranging from 0 to 3 (0 = "not at all" and 3 = "nearly every day"). The Chinese version of GAD-7 has been validated in previous studies ($\alpha = 0.90$) [18]. The Cronbach's α was 0.95 in the present study. Depressive symptoms was measured by Patient health Questionnaire-9 (PHQ-9). It measures the frequency of depressive symptoms in the past two weeks. Each symptom have a possible score of 0–3 points (0 = no, 1 = a few days, 2 = more than half of the days, 3 = almost every day). The total score of the scale is 27 points, higher than 5 points indicate mild depression, higher than 10 points indicate moderate depression, and higher than 15 points indicate severe depression. The Chinese version of PHQ-9 has been validated in previous studies ($\alpha = 0.94$) [19].

Loneliness was assessed by one question "Do you feel lonely?" on a 5 Linkert points: (1 = never, 2 = rarely, 3 = occasionally, 4 = often, 5 = almost every day). With higher scores indicating higher levels of loneliness. *Quality of life* was assessed by 2 question "How do you feel about the quality of your life?" and "Are you satisfied with your present state of health?" of 1–5 points: (1 = extremely unsatisfactory, 2 = rarely not satisfied, 3 = not satisfied or dissatisfied, 4 = very satisfied, 5 = extremely satisfactory). The Cronbach's α was 0.76 in the present study. Sleep quality was assessed by 3 items of Pittsburgh Sleep Questionnaire (PSQI-PT) [20] on a 5 Linkert scale i. How many hours of sleep you usually get per night during the epidemic (not equal to bed time)? ii. Do you take sleeping drugs to help you sleep during the epidemic? iii. During the epidemic, in general, you think of your sense of sleep? With higher scores indicating worse quality of sleep. Cronbach's $\alpha = 0.52$. Social support was assessed by 6 items: i. During the epidemic, when I encounter problems, some people (leaders, relatives, colleagues or classmates) will appear beside me? ii. During the epidemic, I was able to share happiness and sadness with some people (leaders, relatives, colleagues or classmates). iii. During the epidemic, my family was able to give me practical and concrete help. iv. During the epidemic, I was able to get emotional help and support from my family when needed. v. My friends can really help me during the epidemic. vi. My friends can share happiness and sadness with me during the epidemic. Social support is item 1–2, family support item is 3–4 and friend support is 5–6. It is on a 5 point scale (1 = strongly disagree, 2 = disagree, 3 = not sure, 4 = agree, 5 = strongly agree). Cronbach's $\alpha = 0.75 \sim 0.87$.

Data analysis

The characteristics of the sample were presented using means and standardized deviation (*SD*) for continuous variables and percentage was applied for categorical variables. Hierarchical liner regression models were done to investigate the related factors of PTSD symptoms and its subscales. First, we entered socio-demographic factors in the model, in step 2 followed by Risk awareness and Effects of COVID-19 on original mental disease, in step 3 Psychosomatics factors, and in step 4 Support. The increasing of R^2 further verified the importance of the independent variables on dependent variables. In addition, one-way analysis of variance (one-way ANOVA) and post-hoc comparison were used to compare PTSD symptoms between different diagnosis groups. Analyses were conducted by SPSS package, Version 20.0, and R software, version 3.6.1. $p < 0.05$ (two-tails) were considered to have statistical significance in this study.

Results

Socio-demographic and clinical characteristics of the sample

In the survey there were 1,055 psychiatry patients who completed. As in Table 1, Over one-third of the patients of the patients were male (34.5%), and the average age of the patients were 37.15 ($SD = 13.21$) years old. Only half of the patients (47.4%) were married and the majority of participants had high school degree or higher degree (82.6%). A quarter of participants were unemployed (26.8%). Some reported living alone during pandemic (10.4%). The majority of the psychiatry patients lived in urban areas (88.4%), and 28.1% had family annual income equal or above 150,000 RMB (Chinese Yuan). Of the sample, all participants had pre-existing diagnosis, anxiety disorder (35.4%), were Major depressive disorder (26.7%), bipolar disorder (17.6%) and schizophrenia (20.3%). During the COVID-19 pandemic period, almost a half of them reported that they didn't seek mental health services (47.7%). More than half of them were taking psychiatric medicine (79.7%) although they had high barriers due to inconveniences caused by COVID-19 to continue treatment. In addition, more than a half of participants had anxiety symptoms (51.0%) and depressive symptoms (57.3%).

Table 1
Demographic and clinical characteristics of the study sample (N= 1,055)

Variables	Number (n)	Percent (%)
Mean age (SD)	37.15 ± 13.21	
Sex		
Male	364	34.5
Female	691	65.5
Education level		
Junior school or lower	183	17.3
High school	474	44.9
College or above	398	37.7
Marital status		
Married	500	47.4
Unmarried	455	43.1
Others/Not clear	100	9.5
Employment status		
Full-time	419	39.7
Part-time	61	5.8
Unemployed	283	26.8
Retired	142	13.5
Student	150	14.2
Family annual income		
< 30,000	253	24.0
30,000 ~ 60,000	210	19.9
60,000 ~ 150,000	295	28.0
150,000 ~ 250,000	152	14.4
> 250,000	145	13.7
Residence place		
Urban	933	88.4
Rural	122	11.6
Residence status during the pandemic		
Live alone	110	10.4
Live together with others	878	83.2
Live in hospital	62	5.9
Others	5	0.5
Diagnosis of mental disorder		
Anxiety disorder	373	35.4
Major Depressive disorder	282	26.7
Bipolar disorder	186	17.6
Schizophrenia	214	20.3
Medication status during pandemic		
On antipsychotic medications	604	57.3
Not on medications	214	20.3

Note. The unit of annual income is RMB yuan. PTSD: posttraumatic stress disorder.

Variables	Number (n)	Percent (%)
Not clear	237	22.5
See a psychiatrist during pandemic		
Yes	652	61.8
No	403	38.2
Mental health services during pandemic		
Yes	552	52.3
No	503	47.7
Psychotic symptoms		
Anxiety symptoms (≥ 5)	540	51.0
Depressive symptoms (≥ 5)	604	57.3
PTSD symptoms (≥ 24)	436	41.3
<i>Note.</i> The unit of annual income is RMB yuan. PTSD: posttraumatic stress disorder.		

Prevalence of PTSD symptoms

Among the whole sample, 436 (41.3%) showed PTSD symptoms. PTSD symptoms among psychiatry patients with different diagnoses (anxiety disorder group, major depressive disorder group, bipolar disorder group and schizophrenia group) were compared. There was no significant difference in the total score of PTSD ($F(3,1049) = 2.22, p = 0.084$), intrusion subscale ($F(3,1051) = 1.16, p = 0.324$), and avoidance subscale ($F(3,1051) = 0.394, p = 0.758$) between different groups. People with depression had the highest value in arousal subscale ($M = 14.08, SD = 5.30$), in which the depression group was significantly higher than that in the anxiety group ($Mean\ difference = 12.21, SD = 5.30, p < 0.05$) and depression was significantly higher than that in the schizophrenia group ($Mean\ difference = 11.74, SD = 4.94, p < 0.05$) (see Fig. 1).

Associated factors with PTSD symptoms

Hierarchical linear regression results showed that risk factors including risk awareness, symptoms of anxiety and symptoms of depression are the shared risk factors for the total PTSD symptoms and the subscales as in Table 2. Beside the shared common risk factors, unique contributing risk factors were identified for PTSD subscales. Residence (town) was the shared risk factor across PTSD avoidance subscale ($\beta = 0.06, p < 0.05$) and hyperarousal subscale ($\beta = 0.05, p < 0.01$). Medication use was the unique risk factor of PTSD avoidance subscale ($\beta = 0.08, p < 0.05$). Loneliness was the unique risk factor of PTSD hyperarousal subscale ($\beta = 0.06, p < 0.05$). Sleep quality was the unique risk factor of PTSD hyperarousal subscale ($\beta = 0.05, p < 0.05$).

Table 2
Hierarchical linear regression coefficients for different PTSD symptoms (N= 1,055)

Variables	PTSD				Intrusion subscale				Avoidance subscale				Hyperarou
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4	Model 1
Socio-demographics characteristics													
Sex (male)	-0.05	-0.00	0.03	0.02	-0.03	0.02	0.04	0.04	-0.04	-0.00	0.02	0.02	-0.08*
Age	-0.01	0.01	0.10*	0.11**	0.07	0.07	0.15***	0.15***	0.02	0.02	0.09	0.10*	-0.13*
Education	-0.03	-0.02	0.01	0.01	-0.02	-0.01	0.02	0.02	-0.03	-0.02	-0.00	0.00	-0.04
Employment (part-time)	-0.07*	-0.06*	-0.04	-0.04	-0.06	-0.06	-0.04	-0.04	-0.06	-0.06	-0.04	-0.04	-0.06
Employment (unemployed)	-0.05	-0.02	-0.01	-0.02	-0.07	-0.04	-0.03	-0.03	-0.03	-0.01	0.01	0.00	-0.04
Employment (retired)	-0.06	-0.07	-0.07*	-0.07*	-0.06	-0.07	-0.07	-0.07*	-0.07	-0.07	-0.07	-0.07	-0.03
Employment (student)	-0.06	-0.05	-0.06	-0.06	-0.06	-0.05	-0.05	-0.05	-0.05	-0.05	-0.04	-0.04	-0.06
Marital status (unmarried)	-0.03	-0.03	-0.01	-0.01	-0.04	-0.04	-0.02	-0.02	-0.01	-0.01	0.00	0.00	-0.03
Marital status (others)	0.03	0.02	-0.01	-0.01	-0.04	-0.02	-0.03	-0.03	0.05	0.05	0.04	0.04	-0.01
Income	-0.01	0.01	-0.04	-0.04	0.00	0.02	-0.03	-0.03	-0.04	-0.03	-0.06	-0.06	0.03
Residence (town)	0.03	0.04	0.04	0.04	-0.01	0.00	0.00	0.00	0.05	0.06	0.06	0.06*	0.04
Live (alone)	0.00	0.02	0.01	0.01	0.01	0.03	0.03	0.02	0.01	0.02	0.01	0.01	-0.01
Live (in hospital)	0.00	0.00	-0.01	-0.01	0.04	0.03	0.03	0.03	-0.02	-0.03	-0.03	-0.03	-0.01
Live (others)	-0.06*	-0.06	-0.04	-0.04	-0.05	-0.04	-0.03	-0.03	-0.07*	-0.06*	-0.05	-0.05	-0.05
Infection (yes)	0.01	-0.01	0.03	0.02	0.01	-0.02	0.01	0.01	0.03	0.02	0.04	0.04	-0.01
Substance use	0.15***	0.06	-0.01	-0.01	0.12***	0.05	-0.01	-0.02	0.11**	0.05	0.00	0.00	0.16***
Medication (yes)	0.02	-0.02	0.04	0.04	-0.01	-0.04	0.01	0.01	0.07*	0.04	0.08**	0.08**	-0.02
COVID-19 related factors													
Fear of pandemic		0.25***	0.20***	0.20***		0.30***	0.26***	0.26***		0.20***	0.16***	0.16***	
Increased pressure by pandemic		0.38***	0.04	0.04		0.29***	0.01	0.01		0.23***	0.01	0.02	
Clinical treatment during pandemic		0.03	0.02	0.02		0.04	0.03	0.03		0.02	0.01	0.02	
Mental health guidance during pandemic		-0.01	-0.04	-0.04		0.01	-0.02	-0.02		-0.05	-0.07*	-0.08**	
Medication barriers due to pandemic		-0.17***	-0.00	0.00		-0.13**	0.00	0.00		-0.09	0.02	0.02	
Psychosomatics factors													
Loneliness			0.05	0.05			0.02	0.02			0.06	0.05	
Quality of life			0.03	0.05			0.05	0.06			0.06	0.08*	
Sleep quality			0.03	0.03			0.03	0.04			-0.01	-0.01	
Anxiety			0.48***	0.48***			0.42***	0.41***			0.36***	0.36***	
Depression			0.12**	0.12**			0.11*	0.11*			0.05	0.05	
Support													
Social support				0.01				0.02				-0.03	

Note. All the regression coefficients in the above table were standardized regression coefficients. * $p < .05$; ** $p < .01$; *** $p < .001$.

Variables	PTSD				Intrusion subscale			Avoidance subscale			Hyperarou		
Family support				-0.01				-0.03			-0.01		
Friends support				-0.05				-0.01			-0.04		
<i>Adjusted R²</i>	0.017	0.160	0.445	0.445	0.020	0.159	0.360	0.360	0.018	0.091	0.217	0.217	0.028
ΔR^2		0.144	0.285	0.000		0.140	0.201	-0.000		0.073	0.125	0.000	

Note. All the regression coefficients in the above table were standardized regression coefficients. * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

This is the first study for screening PTSD symptoms in psychiatry patients in Beijing China. The prevalence of PTSD symptoms (41.3%) in our study was much higher than the lifetime prevalence of PTSD symptoms in the general population (ranges from 2–9%) as shown in earlier research [21]. A longitudinal study about the mental health condition of general population during COVID-19 in China found that the mean IES-R scores of the survey respondents (from 32.98 to 30.76) were above 24 for PTSD symptoms. During the initial evaluation, moderate-to-severe stress were 8.1% [22]. The prevalence of PTSD symptoms in our study was even higher than medical assistance workers (31.6%) during the COVID-19 pandemic. The findings in this study suggest a great need for screening PTSD symptoms in psychiatry patients.

In our study in the PTSD high-arousal subscales: the major depressive disorder group is higher than the anxiety disorder group and the schizophrenia group. There was no significant difference in PTSD level among the four diagnosis, that is, the history itself may not affect the onset of PTSD. But it may indicate that patients with different diseases have different psychological characteristics are affected differently by the epidemic. Possible explanations in psychiatry patients with different diagnosis include little awareness of risk, cognitive impairment, and diminished efforts of regarding personal protection [8]. More research including qualitative research between patients with different diagnosis could be done.

In our study, risk factors for PTSD symptoms caused by COVID-19 included age, risk awareness, symptoms of anxiety, symptoms of depression. The hypothesis was well supported by the data of the study that mental health status (symptoms of anxiety and depression) is a significant predictor of PTSD symptoms. There have been reports that anxiety, stress and depression often co-existing and comorbid with post-traumatic stress disorder [23, 24]. Recent neuroscience research showed higher anxiety sensitivity tends to increase PTSD severity [25]. People with higher levels of stress could find it easy to be impatient, feel upset or agitated, and difficult to relax resulting in bad impacts on PTSD symptoms [26]. The result is similar to other studies in general population. A study in Austria showed that the COVID-19 pandemic and lockdown was reported stressful for younger adults (< 35 years), and people without work [1]. Self-rated poor health during an outbreak is significantly associated with greater psychological impact and higher levels of stress, according to a study in China [11].

As for the hypothesis on social relationship is associated with PTSD symptoms, this study did not find a significant association between support (including social support, family support and friends support) and PTSD symptoms. However, some factors including loneliness, sleep quality, resided in town, medication use, mental health guidance during pandemic, employment status is student and friends support are related to the PTSD subscales. We could do more research about this. Further studies should be done to examine how long PTSD symptoms may persist or develop in the future among the psychiatry patients over time.

Limitations

There are several limitations should be considered in mind as reading the findings of this study. 1. This study is cross-sectional design. It is unclear in what way PTSD symptoms among the psychiatry patients change over time. Longitudinal study is needed to be conducted to examine the protective factors and long-term impacts of PTSD in psychiatric patients during the COVID-19 pandemic. 2. The sample was only in several hospitals in Beijing China, a multicenter study in the whole country or the world is needed to be done in order to know more about PTSD symptoms in psychiatry patients.

Conclusions

The study revealed that age, risk awareness, symptoms of anxiety, symptoms of depression are significant predictors of PTSD symptoms. It provides very important information to understand the psychological impacts on psychiatric patients due to the COVID-19 pandemic. Future research should continue to understand the PTSD condition of psychiatric patients and find effective intervention for PTSD.

Declarations

Ethics approval and consent to participate

Before the survey, all participants were informed of the purpose and procedure of the survey and signed an online informed consent. The Beijing Anding Hospital affiliated to Medical Capital University. Ethics Committee has approved this investigation (No: 2020-10).

Consent for publication

Not applicable. All participants participated in the survey anonymously.

Availability of data and materials

The datasets used during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Author's contributions

All authors contributed to this study significantly. LRT, YF and YG designed the survey; LRT, JC and YG collected data; YF analysed and interpreted data; LRT and YF drafted the manuscript and all author contributed to revise it. All authors read and approved the final manuscript.

References

1. Pieh C, Budimir S, Probst S. T. The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *J Psychosom Res.* 2020;136:110186.
2. Poyraz ÇB, Poyraz CA, Olgun Y, Gürel O, Alkan S, Ozdemir YE, et al. Psychiatric morbidity and protracted symptoms after COVID-19. *Psychiatry Res.* 2021;295:113604.
3. Liu D, Baumeister RF, Veilleux JC, Chen C, Liu W, et al. Risk factors associated with mental illness in hospital discharged patients infected with COVID-19 in Wuhan, China. *Psychiatry research.* 2020;292:113297.
4. Chang MC, Park D. Incidence of Post-Traumatic Stress Disorder After Coronavirus Disease. *Healthcare (Basel).* 2020;8(4):373.
5. Cooke JE, Eirich R, Racine N, Madigan S. Prevalence of posttraumatic and general psychological stress during COVID-19: A rapid review and meta-analysis. *Psychiatry Res.* 2020;292:113347.
6. Que J, Lu L, Shi L. Development and challenges of mental health in China. *Gen Psychiatry.* 2019;32(1):e100053.
7. Sergeant A, Reekum EA, Sanger N, Dufort A, Rosic T, Sanger S, et al. Impact of COVID-19 and other pandemics and epidemics on people with pre-existing mental disorders a systematic review protocol and suggestions for clinical care. *BMJ Open.* 2020; e040229.
8. Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry.* 2019;32(1):e100053.
9. Druss B. Addressing the COVID-19 pandemic in populations with serious mental illness. *JAMA Psychiatry.* 2020;77(9):891–2.
10. Pfefferbaum B, North C. Mental Health and the Covid-19 Pandemic. *N Engl J Med.* 2020;383(6):510–2.
11. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho C, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *International Journal of Environmental Research Public Health.* 2020;17(5):1729.
12. Pinkham AE, Ackerman RA, Depp CA, Harvey DP, Moore R. A Longitudinal Investigation of the Effects of the COVID-19 Pandemic on the Mental Health of Individuals with Pre-existing Severe Mental Illnesses. *Psychiatry Res.* 2020;294:113493.
13. Casagrande M, Favieri F, Tambelli R, Forte G. The enemy who sealed the world: effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep Med.* 2020;75:12–20.
14. Donna McCabe DAG. The Impact of Event Scale - Revised (IES-R). 2019.
15. Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, et al. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry.* 2009;54(5):302–11.
16. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. 2020; 17(5):1792.
17. Wu XJ, Wang SL, He YH, Ge CJ, Song GH, Shen ZX. Reliability and Validity of the Impact of Event Scale-Revised (IES-R) in the Isolated Population under the Epidemic Situation of COVID-19. *Chinese Journal of Clinical Psychology.* 2020;4(28):760–2.
18. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder. *Arch Intern Med.* 2006;166(10):1092–7.
19. Ye X, Shu HL, Feng X, Xia DM, Wang ZQ, Mi WY, et al. Reliability and validity of the Chinese version of the Patient Health Questionnaire-9 (C-PHQ-9) in patients with psoriasis a cross-sectional study. *BMJ Open.* 2020;10(7):eo33211.
20. João KADR, Becker NB, Jesus SDN, Martins RIS. Validation of the Portuguese version of the Pittsburgh Sleep Quality Index (PSQI-PT). *Psychiatry Res.* 2017;247:225–9.
21. Atwoli L, et al. Epidemiology of posttraumatic stress disorder. *Current Opinion in Psychiatry.* 2015;28(4):307–11.
22. Wang CY, Pan RY, Wan XY, Tan YL, Xu LK, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain, Behavior, and Immunity.* 2020; 87: 40–48.
23. Kerai S, Khan UR, Islam M, Asad N, Razzak J, Pasha O. Post-traumatic stress disorder and its predictors in emergency medical service personnel: a cross-sectional study from Karachi, Pakistan. *BMC Emerg Med.* 2017;17(1):26.

24. Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS out break on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry*. 2018;87:123–7.
25. Matsumoto N, Kawaguchi J. Negative item memory and associative memory: Influences of working memory capacity, anxiety sensitivity, and looming cognition. *J Behav Ther Exp Psychiatry*. 2020;68:101569.
26. Dohyun L. The convergent, discriminant, and nomological validity of the Depression Anxiety Stress Scales-21 (DASS-21). *J Affect Disord*. 2019;259:136–42.

Figures

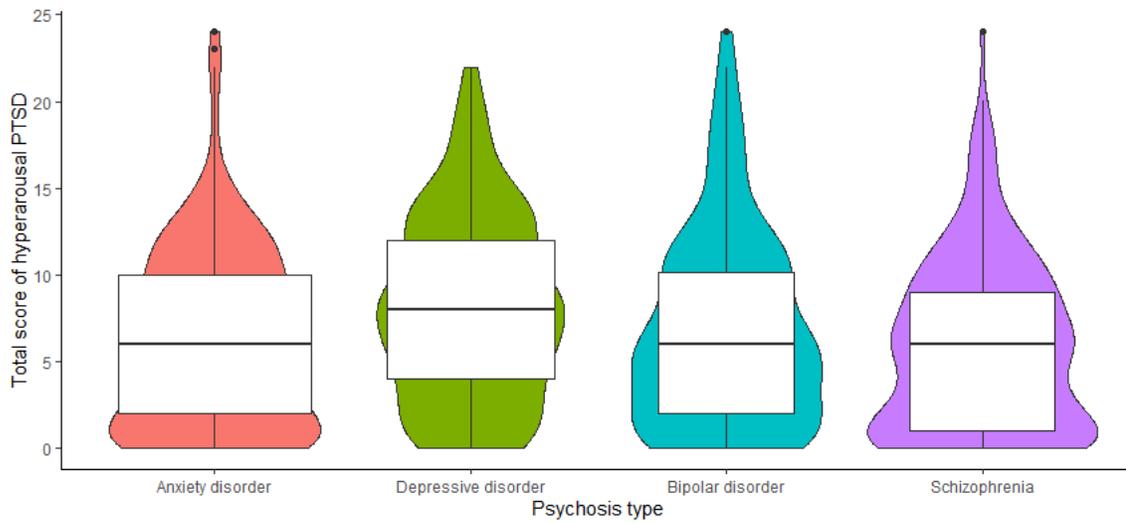


Figure 1

The value of PTSD symptoms in arousal subscale among different diagnosis group (anxiety disorder group, major depressive disorder group, bipolar disorder group and schizophrenia group)