

## The Association between Stress and Illness Anxiety during the Corona-Virus Outbreak in China in 2019

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### Quantitative Study

#### Abstract

**Background:** The Corona-virus (COVID-19) outbreak in China in 2019 can cause psychological traumatic reaction; it can be a risk factor for illness anxiety. The predictors of severe illness anxiety have not yet been explored.

**Methods:** The present research was a cross-sectional study. The Impact of Event Scale-Revised (IES-R) was used to evaluate stress reaction, and Whiteley Index-7 (WI-7) was applied to measure illness anxiety. Participants with scores above the median WI-7 score were defined as severe illness anxiety and who scored lower than the median WI-7 score were defined as not severe illness anxiety. Logistic regression was used to calculate the odds ratio (OR) and 95% CI. Stress level was divided into mild-, moderate, and severe, which was included in the logistic model to estimate the association of stress and illness anxiety..

**Results:** After adjusting for covariates, the OR of mild, moderate, and severe stress reaction level was 3.32 (95% CI: 2.21, 4.99), 6.01 (95% CI: 2.99, 12.05), and 14.54 (95% CI: 7.99, 26.47), respectively. The P for trend was less than 0.001 across the levels of stress reaction.

**Conclusion:** The severe stress reaction is associated with severe illness anxiety during the outbreak of COVID-19 in China. The corona crisis intensifies the experience of personal stress that increases the fear of illness through COVID-19 in China. Further qualitative and follow-up studies are essential to illustrate the development of illness anxiety.

**Keywords:** Stress; Anxiety; COVID-19 outbreak

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## Introduction

The Corona-virus pandemic (COVID-19) can cause psychological trauma among the population living in the epidemic district (Vyner, 1988). Studies have showed a high stress level in both the general population and medical staff during the outbreak of COVID-19 in China (Huang, Han, Luo, Ren, & Zhou, 2020). The reactions to crisis vary greatly and are shaped by individuals' cultural background and life experience. In the Chinese culture, there is a tendency for somatic compliance when encountering stress (Kirmayer & Young, 1998). Higher number of reported somatic symptoms can contribute to illness anxiety, which is characterized by a preoccupation with the notion that one is physically ill (Neng & Weck, 2015).

Previous studies have proven that psychological stress is a risk factor for illness anxiety (Bennett, Patterson, & Noble, 2016). An invisible virus can cause a traumatic experience, uncertainty of health, and irrational beliefs about health. Exposure to COVID-19 can be a trigger for illness anxiety, and illness anxiety can be developed and maintained by absorbing threatening information through social media or hearing about relatives infected with COVID-19 (Rachman, 2012).

Excessive illness anxiety is a risk factor for the overuse of medical resources. But those people who experienced excessive illness anxiety can avoid medical resources for they are to fear to face with medical facilities. But they are also under great pressure and can commit suicide to release the pressure, which is detrimental. (Bobevski, Clarke, & Meadows, 2016). Everyone can experience illness anxiety to some degree, and mild illness anxiety can promote constructive health behavior and adherence to medical advice (Asmundson & Taylor, 2020). People who experience a high level of illness anxiety often visit hospitals more frequently, and thus, overuse the limited medical resources. Nevertheless, previous studies have mainly explored the risk factors of presence of illness anxiety, and have not focused on severe forms of illness anxiety (Bennett et al., 2016; Reuman, Jacoby, Blakey, Riemann, Leonard, & Abramowitz, 2017).

The aim of the present study was to assess a predictor of severe illness anxiety. We assumed that stress reaction can predict the severity of illness anxiety and a high level of stress reaction indicates severe illness anxiety.

## Methods

*Participants:* We designed a cross-sectional study and obtained Institutional Review Board approval before the study. An electronic questionnaire was designed and sent to the participants by We-Chat during 5th to 12th March. An electronic informed consent was obtained from each participant. The study inclusive criteria were being 18-70 years of age, understanding the content of the questionnaire, and living in China during the COVID-19 pandemic. The study exclusive criterion was being infected with COVID-19.

### *Instruments*

*Demographic information:* We collected data on basic demographic characteristics including sex, age, occupation, education level, and marital status. We designed COVID-19 related questions to collect data on stressful events. The questions were related to whether the respondents are medical staff, are working on the frontline against COVID-19, have close relatives working on the frontline, and have close relatives infected by the virus. A positive (yes) response to any one of the above questions was defined as experiencing stressful events.

*Stress levels:* The Impact of Event Scale-Revised (IES-R) was used to measure the level of stress reaction. The IES-R includes 22 items, and each item is rated on a 5-point scale ranging between 0 (Not at all) and 4 (Extremely). The IES-R has been

translated into many languages including Chinese, and its reliability and validity have been approved in Chinese (Wu & Chan, 2003). The total score of the scale represents the degree of stress; 4 categories were applied in our analysis including 0–23 (normal), 24–32 (mild psychological impact), 33–36 (moderate psychological impact), and > 37 (severe psychological impact) (Creamer, Bell, & Failla, 2003; Motlagh, 2010).

*Illness anxiety:* Whiteley Index-7 (WI-7) was used to evaluate the degree of illness anxiety (Tu et al, 2016). We used a 5-point Likert scale version of the WI which comprised 7 items (Welch, Carleton, & Asmundson, 2009). The total score of WI-7 represents the severity of illness anxiety. The WI-7 was used as a screening tool of illness anxiety diagnosis of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5). However, the cut-off score was not determined to identify a severe illness anxiety state; the median of the total WI-7 score was used as a cut-off of severe illness anxiety in our sample.

*Statistical analysis:* The study participants were divided into two groups according to the total WI-7 score. A WI-7 score of above median was defined as severe illness anxiety, and a lower score than median was defined as not severe illness anxiety.. Medians (maximum and minimum) and percentages are used in the present text to present anomalous distribution of variables and categorical variables, respectively. Independent sample t-test, chi-square test, and Mann-Whitney U test were used in univariate analysis between the two groups. Multiple logistic regression was used to calculate odds ratio (OR) and 95% confidence interval (95% CI). Variables with a P value < 0.2 in univariate analysis were included in the multivariate analysis. . Stress level was divided into 3 categories: mild-, moderate, and severe, which was included in the logistic model to estimate the association of stress and illness anxiety. IES-R degree was included in model as categorical variable and the median of each category was included into the model to estimate the P for trend. All statistical analyses were performed in SPSS software (version 25.0, IBM Corp., Armonk, NY, USA). All P values < 0.05 were considered as statistically significant.

**Results**

We received 727 responses, 1 was a repeated questionnaire. Among the respondents, 10 lived abroad and 1 was under 18 years of age. Thus, 715 validated questionnaires from 30 provinces and districts were included in the analysis. And 240 (33.6%) out of 715 subjects were medical staff.

The median score of WI-7 was 11.0 (8.0, 15.0) and 338 (47.3%) participants were allocated into severe illness anxiety group and 377 (52.7%) of them were allocated into not severe illness anxiety group The results of univariate analysis are presented in table 1.

**Table 1.** Demographic characteristics of low illness anxiety and severe illness anxiety groups

Variable	WI-7 ≤ 11 (378)	WI-7 > 11 (338)	χ <sup>2</sup> , t, or z	P-value
Sex				
Male (%)	162 (42.9)	136 (40.4)	0.458 <sup>a</sup>	0.498
Age (years)	33.79 ± 9.26	33.21 ± 9.28	0.828 <sup>b</sup>	0.408
Education Levels (%)				
Senior high school or below	38 (11.0)	38 (11.3)	2.910 <sup>a</sup>	0.233
College	142 (37.6)	144 (42.7)		
Postgraduate or above	198 (52.4)	155 (46.0)		
Marital status (%)				
Single	148 (39.2)	146 (43.3)	1.550 <sup>a</sup>	0.461
Married	206 (54.5)	168 (49.9)		
Other	24 (6.3)	23 (6.8)		
Medical personnel yes (%)	138 (36.5)	102 (30.3)	3.112 <sup>a</sup>	0.078
Stressful events yes (%)	53 (14.0)	47 (13.9)	0.001 <sup>a</sup>	0.977
Impact of Event Scale-Revised	11.0 (2.0, 22.0)	27.0 (18.0, 38.0)	-13.012 <sup>c</sup>	< 0.001

<sup>a</sup>Chi-square test, <sup>b</sup>Independent sample t-test, <sup>c</sup>Mann-Whitney U test

The two groups did not significantly differ in terms of sex, age, education, marital status, medical personnel (138 vs 102), and stressful events. A significant difference was observed in IES-R score between the two groups ( $P < 0.05$ ).

Table 2 shows the models of IES-R and illness anxiety; the two models are similar. After adjusting for covariates, the OR of mild, moderate, and severe stress reaction level was 3.32 (95% CI: 2.21, 4.99), 6.01 (95% CI: 2.99, 12.05), and 14.54 (95% CI: 7.99, 26.47), respectively. In addition, the P for trend was less than 0.001 across the levels of stress reaction.

## Discussion

We found that stress level was associated with illness anxiety severity. The severe degree of stress reaction is 14.54 times that of severe illness anxiety risk compared with normal stress level.

People experienced crisis both their bodies and mind, and the reaction was individualized. Previous studies found that subjective stress accounted for illness anxiety rather than the event itself (Noyes et al., 2004). In patients with obsessive compulsive disorder (OCD), the tendency to overestimate threat was associated with illness anxiety (Reuman et al., 2017). Though these studies did not focus on severe illness anxiety, the findings were similar to that of the present study. The shared feature of stress reaction and illness anxiety was excessive (Olatunji, Deacon, & Abramowitz, 2009). There is an overlap between stress reaction and anxiety. Both stress reaction and anxiety have psychological and physiological hyperarousal symptoms. Moreover, illness anxiety was highly correlated with anxiety disorder. During the current COVID-19 crisis, people feel unsafe.. Physiological reactions and somatic symptoms caused by stress can be catastrophe into illness and people will feel the safety of their body was threatened. Therefore, illness anxiety was associated with misinterpretations of hyperarousal of body sensations as signs of illness (Scarella, Laferton, Ahern, Fallon, & Barsky, 2016). The COVID-19 crisis can involve both physiological and psychological reactions, and illness anxiety can combine the two as a reaction to crisis (Lorenzi, Hardoy, & Cabras, 2000).

The neural mechanism associated with stress reaction and illness anxiety was the overactivation of the amygdala and hypothalamic-pituitary-adrenal (HPA) axis. Assessment of functional magnetic resonance imaging (fMRI) found hyperactivation in the bilateral amygdala in patients with illness anxiety compared to healthy controls (Yan, Witthoft, Bailer, Diener, & Mier, 2019). Overactivation of the amygdala was observed with the incidence of acute stress (Fitzgerald, DiGangi, & Phan, 2018). Stress reaction also activated the HPA axis (Seo, Rabinowitz, Douglas, & Sinha, 2019).

**Table 2.** Logistic regressions of stress reaction levels and illness anxiety severity

Model <sup>a</sup>	Severe illness anxiety (yes/no) <sup>b</sup>	OR	95% CI	Wald	P-value
Impact of Event Scale-Revised					
Normal/10	136/436	1		108.85	
Mild/27	77/129	3.32	2.21, 4.99	33.30	< 0.001
Moderate/34	32/44	6.00	2.99, 12.05	25.47	< 0.001
Sever/43	92/106	14.54	7.99, 26.47	76.77	< 0.001
Medical personnel	102/240	0.72	0.51, 1.02	3.50	0.061
P for trend		1.08	1.07, 1.09	112.69	< 0.001

<sup>a</sup>: The model included degree of stress reaction and medical personnel as independent variables, and severe illness anxiety as dependent variable. P for trend was calculated using logistic regression included median of each stress level.  $R^2 = 0.242$

<sup>b</sup>: Severe illness anxiety was defined as WI-7 > 11.

Impaired cortisol secretion was found in patients with somatoform disorder including those with hypochondriasis (Rief & Auer, 2000). There were common mechanisms for stress reaction and illness anxiety. Thus, future studies can explore the mechanism of stress reaction and illness anxiety.

The present study had some limitations. We used a median score of WI-7 as cut-off of severe illness anxiety because there was no specific cut-off of WI-7 corresponding with severe illness anxiety in the DSM-5. The cross-sectional design of the study could not establish causality. The R<sup>2</sup> of the regression model was small and other variables associated with illness anxiety need to be investigated. Future qualitative studies are essential to further explore the cultural background effect. Moreover, a follow-up study is needed to illustrate the development of illness anxiety after stress.

We found a relationship between stress reaction and severe illness anxiety during the COVID-19 outbreak in China, This study provides information about illness anxiety in the general population. Illness anxiety is always discussed in the background of psychosomatic settings, the COVID-19 psychological crisis is associated with illness anxiety, and the view of psychosomatic can offer method such as ensure the safety of body to cope with the crisis. The interplay of stress and illness anxiety should always be considered as part of a psychosomatic illness. Psychological aspects of COVID-19 correlate closely with illness anxiety. Therefore it makes sense to use psychosomatic concepts of understanding and treatment..

## Conclusion

A high level of stress reaction is associated with severe illness anxiety during the outbreak of COVID-19 in China. The corona crisis intensifies the experience of personal stress that increases the fear of illness through COVID-19 in China. Further qualitative and follow-up studies are essential to illustrate the development of illness anxiety.

## Conflict of Interests

Authors have no conflict of interests.

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