The psychological distress and coping styles in the early stages of the 2019 coronavirus disease (COVID-19) epidemic in the general mainland Chinese population: a web-based survey

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Abstract

Background

As the epidemic outbreak of 2019 coronavirus disease (COVID-19), general population may experience psychological distress. Evidence has suggested that negative coping styles may be related to subsequent mental illness. Therefore, we investigate the general population's psychological distress and coping styles in the early stages of the COVID-19 outbreak.

Methods

A cross-sectional battery of surveys was conducted from February 1-4, 2020. The Kessler 6 psychological distress scale, the simplified coping style questionnaire and a general information questionnaire were administered on-line to a convenience sample of 1599 in China. Spearman’s correlation was used to measure the correlations among category variables.

Results

General population’s psychological distress were significant differences based on age, marriage, epidemic contact characteristics, concern with media reports, and perceived impacts of the epidemic outbreak (all p <0.001) except gender (p=0.316). Those with a history of visiting Wuhan and a history of epidemics occurring in the community, more concern with media reports, perceived more severe impacts and negative coping style had a higher level

of psychological distress, which was significantly positively correlated with a history of visiting Wuhan (r=0.548, p<0.001), a history of epidemics occurring in the community (r=0.219, p<0.001), and concern with media reports (r=0.192, p<0.001). Coping styles were significantly different across all category variables (all p <0.001), and negatively correlated with other category variables (all p<0.01) except age and marriage. Psychological distress was significantly negatively correlated with the coping style (r=-0.573, p<0.01).

Conclusions

In the early stages of COVID-19, general population with epidemic contact characteristics, excessive concern with media reports, and perceived more severe impacts have higher levels of psychological distress. Psychological distress was significantly negatively correlated with the coping style. Interventions should be implemented early, especially for those population with a high level of psychological distress and/or with a negative coping style.

Introduction

The epidemic of the 2019 coronavirus disease (COVID-19) has aroused widespread concern throughout society in China. Because the virus can be transmitted through droplets, contact, etc. [1], cities in many regions of China have closed non-essential public places, restricted mass gathering activities, and enacted other control measures to effectively control the spread of the virus [2]. The epidemic has had a strong impact on general population's daily life. At the same time, as the epidemic continues, general population gradually experience different levels of psychological distress, such as nervousness, fear of infection, anxiety, depression, sleep problems, and inattention [3,4]. Previous studies have reported that some psychological problems often occur during similar epidemic [5,6] or other traumatic stress events, such as natural disasters [7,8], disease [9], or long-term employment in high stress occupations [10-12], and may last for a long time [13,14].

When faced with stress or traumatic experiences, general population often responds differently, with some responding positively and others responding negatively. Evidence has suggested that coping styles in the face of stress have an impact on the quality of general population’s life [15,16], and negative coping styles may be related to psychological distress or mental illness such as post-traumatic stress disorder (PTSD), anxiety, and depression

[7,8,12]. For this reason, we conducted this study in the early stages of this epidemic to investigate the general population's psychological distress and coping style related to the epidemic of COVID-19 so that those who have high levels of psychological distress and/or respond negatively can be detected early and undergo timely intervention.

Methods

This study was conducted through an online survey, starting at 16:00 on February 1, 2020 and ending at 24:00 on February 4, and the survey was approved by the ethical review board of the West China Hospital of Sichuan University. The snowball sampling method was used to invite subjects. All invitees completed the questionnaire online via Questionnaire Star (https://www.wjx.cn). An initial set of invitees (10 participants) was chosen to ensure broad representation of age, gender, occupation, education level, and city. This set of invitees then forwarded the questionnaire to 10 companions whom they considered suitable for the survey, and this second set forwarded the questionnaire in the same way. The study included a general population aged 18 years or older who volunteered to participate in the study, and respondents were excluded if they reported a history of mental illness and/or could not complete the online survey independently.

Data collection

A self-made questionnaire was used to collect demographic and epidemiological information of participants, including gender, age, marriage, epidemic contact and concern characteristics, and perceived epidemic impacts of the epidemic of COVID-19.

Psychological distress assessment

The Kessler 6 psychological distress Scale (K6) was used to assess the psychological distress of participants; this scale has been proven to have cross-cultural reliability and validity [17]. It contains six questions that ask participants to rate how often they have felt ‘nervous’, ‘hopeless’, ‘restless or fidgety’, ‘so depressed that nothing could cheer you up’, ‘that everything was an effort’, and ‘worthless’ during the past 30 days.

Coping style assessment

The Simplified Coping Style Questionnaire (SCSQ) was used to assess the participants’ coping styles during the COVID-19 epidemic; this questionnaire has been proven to have good reliability and validity in Chinese [18]. The SCSQ contains twenty items, with each item using a four-point score (0 = never, 1 = seldom, 2 = often, 3 = always), and two subscales: positive coping (12 items) and negative coping (8 items). According to the average and standard deviation of the positive coping style and the negative coping style scores, a Z conversion is used to calculate their

155 respective standard scores, and then, the negative coping standard scores are
156 subtracted from the positive coping style standard scores to calculate the
157 tendency value of coping style. A result greater than 0 was defined as a
158 participant adopting a positive coping style when faced with stress, and a
159 result less than 0 was defined as a participant adopting a negative coping
160 style [19].

161

162 **Statistical analysis**

163 Differences in psychological distress (K6 score) among categorical variables
164 were tested by t-tests or one-way analysis of variance, and differences in
165 coping styles were tested by chi-squared tests. Correlations among all
166 categorical variables were measured by Spearman's correlation. All statistical
167 analyses were conducted in SPSS version 22.0 (IBM, Chicago, IL, USA),
168 and $p < 0.05$ was considered to be statistically significant.

169

170 **Quality control**

171 The same IP address could be used only once to complete the questionnaire,
172 which did not collect any personal information such as names, thereby
173 ensuring anonymity and honest responses. The time spent on each
174 questionnaire was monitored automatically, and the whole questionnaires
175 completed in fewer than 120 seconds were rejected as invalid.

176

177 # Results

178 ## Sample characteristics

179 There were 1607 individuals from 26 regions of China who completed this
180 survey, and 1599 (99.5%) were included in the analysis participants. Among
181 all participants, 1068 were female (66.8%); ages ranged from 18 to 84 years
182 old (mean 33.9±12.3 years); 914 were married (57.2%); 326 had a history of
183 visiting Wuhan (20.4%); and 333 had a history of epidemics occurring in
184 their community (20.8%) (Table 1).

185

186 **Table1 Sample description**

Variables	n (%)
Total	1599(100.0)
Demographic characteristics	
Gender	
female	1068(66.8)
male	531(33.2)
Age (mean 33.9±12.3, years)	
18-30	722(45.2)
31-40	471(29.5)
41-50	254(15.9)
>50	152(9.5)
Marriage	
single	624(39.0)
married	914(57.2)
divorced	61(3.8)
Epidemic contact characteristics	
History of visiting Wuhan	
no	1273(79.6)
yes	326(20.4)
History of epidemics occurring in the community	
no	1266(79.2)
yes	333(20.8)
Concern with media reports related to the epidemic	
less concerned	16(1.0)

concerned	141(8.8)
more concerned	428(26.8)
extremely concerned	1014(63.4)
Perceived impacts of the epidemic	
Changes over living situations	
feel relax	209(13.1)
no change	479(30.0)
feel nervous	911(56.9)
Emotional control	
no difficult	832(52.0)
less difficult	304(19.0)
difficult	70(4.4)
more difficult	70(4.4)
extremely difficult	323(20.2)
Epidemic-related dreams	
no	987(61.7)
less	151(9.4)
general	115(7.2)
more	33(2.1)
extremely large	313(19.6)

Comparison of the psychological distress

The results revealed significant differences in the participants' psychological distress based on age, marriage, epidemic contact characteristics, concern with media reports related to the epidemic, and perceived impacts of the epidemic (all p <0.001); there were no significant differences based on gender (p =0.316). As age increases and marital status changes, K6 scores have a downward trend. Those with a history of visiting Wuhan and a history of epidemics occurring in the community have a higher level of psychological distress than those without such experiences. The psychological distress tended to increase with concern with media reports related to the epidemic and perceived impacts of the epidemic. At the same time, the results also show that those with a negative coping style have a

200 higher level of psychological distress than those with a positive coping style
201 (Table 2).

202

203 **Table2 Psychological distress (K6 scores) of participants (n=1599).**

Variables	Means (SD)	95%CI	t/F*	*p*
Total	7.7(7.7)	7.36,8.11		
Demographic characteristics				
Gender			-1.002	0.316
female	7.6(7.5)	7.15,8.05		
male	8.0(8.1)	7.32,8.69		
Age category (mean33.9±12.3, years)			102.04	<0.001
18-30	11.1(8.9)	10.47,11.76		
31-40	5.2(5.3)	4.77,5.73		
41-50	4.8(4.7)	4.22,5.36		
>50	4.3(4.8)	3.55,5.08		
Marriage			141.73	<0.001
single	11.5(9.0)	10.75,12.17		
married	5.4(5.4)	5.01,5.72		
divorced	5.2(6.0)	3.68,6.68		
Epidemic contact characteristics				
History of visiting Wuhan			-40.86	<0.001
no	5.0(4.8)	4.70,5.23		
yes	18.6(7.1)	17.80,19.34		
History of epidemics occurring in the community			-10.25	<0.001
no	6.8(7.0)	6.37,7.14		
yes	11.5(8.8)	10.50,12.40		
Concern with media reports related to the epidemic			21.84	<0.001
less concerned	2.4(2.6)	1.10,3.65		
concerned	4.0(3.9)	3.34,4.62		
more concerned	6.9(7.3)	6.19,7.58		
extremely concerned	8.7(8.0)	8.21,9.20		
Perceived impacts of the epidemic				
Changes over living situations			331.71	<0.001
feel relax	2.4(2.8)	2.01,2.78		
no change	3.2(3.0)	2.94,3.47		
feel nervous	11.3(8.2)	10.81,11.87		
Emotional control			1863.07	<0.001
no difficult	3.0(2.8)	2.84,3.22		
less difficult	5.6(3.5)	5.23,6.01		

difficult	8.9(3.9)	7.97,9.80		
more difficult	10.3(5.1)	9.11,11.49		
extremely difficult	21.0(3.3)	20.68,21.39		
Epidemic-related dreams			1642.78	<0.001
no	3.6(3.4)	3.38,3.80		
less	6.2(3.8)	5.62,6.83		
general	7.4(4.5)	6.54,8.18		
more	10.7(4.6)	9.13,12.27		
extremely large	21.4(2.6)	21.06,21.65		
Coping style			37.41	<0.001
negative	15.0(8.3)	14.31,15.70		
positive	4.0(3.5)	3.75,4.17		

Note: * representing the differences of K6 scores among categorical variables by t-test or one-way analysis of variance

Comparison of the coping style

The ratios of the coping styles are 34.2% negative and 65.8% positive. The comparison found that the coping style was significantly different across all category groups (all p <0.001) (Table 3). Compared with the positive coping style, the negative coping style occurred more in those between 18 and 30 years old, single people, those with a history of visiting Wuhan, those with a history of epidemics occurring in the community, those who reported that perceived emotional control was extremely difficult and those who reported having many epidemic-related dreams (Table 3).

Table3 Coping style of participants (n=1599).

Variables	Coping Style			
	Negative (%)	Positive (%)	X^2	p
Total	547(34.2)	1052(65.8)		
Demographic characteristics				
Gender			6.83	0.009
female	342(32.0)	726(68.0)		
male	205(38.6)	326(61.4)		

Age (mean33.9±12.3, years)			180.89	<0.001
18-30	373(51.7)	349(48.3)		
31-40	105(22.3)	366(77.7)		
41-50	43(16.9)	211(83.1)		
>50	26(17.1)	126(82.9)		
Marriage			172.73	
single	335(53.7)	289(46.3)		
married	197(21.6)	717(78.5)		
divorced	15(24.6)	46(75.4)		
Epidemic contact characteristics				
History of visiting Wuhan			440.89	<0.001
no	275(21.6)	998(78.4)		
yes	272(83.4)	54(16.6)		
History of epidemics occurring in the community			56.86	<0.001
no	375(29.6)	891(70.4)		
yes	172(51.7)	161(48.4)		
Concern with media reports related to the epidemic			13.98	0.003
less concerned	4(25.0)	12(75.0)		
concerned	32(22.7)	109(77.3)		
more concerned	135(31.5)	293(68.5)		
extremely concerned	376(37.1)	638(62.9)		
Perceived impacts of the epidemic				
Changes over living situations			172.61	<0.001
feel relax	36(17.2)	173(82.8)		
no change	76(15.9)	403(84.1)		
feel nervous	435(47.8)	476(52.3)		
Emotional control			715.31	<0.001
no difficult	118(14.2)	714(85.8)		
less difficult	68(22.4)	236(77.6)		
difficult	27(38.6)	43(61.4)		
more difficult	24(34.3)	46(65.7)		
extremely difficult	310(96.0)	13(4.0)		
Epidemic-related dreams			711.68	<0.001
no	166(16.82)	821(83.18)		
less	39(25.83)	112(74.17)		
general	22(19.13)	93(80.87)		
more	14(42.42)	19(57.58)		
extremely large	306(97.76)	7(2.24)		

Correlation analysis

The correlation analysis found that psychological distress was significantly

positively correlated with a history of visiting Wuhan (r=0.548, p<0.001), a history of epidemics occurring in the community (r=0.219, p<0.001), concern with media reports related to the epidemic (r=0.192, p<0.001), and perceived changes over living situations (r=0.571, p<0.001), emotional control (r=0.752, p<0.001) and epidemic-related dreams (r=0.708, p<0.001). Psychological distress was significantly negatively correlated with age (r=-0.371, p<0.001), marriage (r=-301, p<0.001) and coping styles (r=-0.573, p<0.001); there was no significant correlation with gender. The coping style was significantly positively correlated with age and marriage, and significantly negatively correlated with other category variables. All epidemic contact characteristics and concern with media reports related to the epidemic were significantly positively correlated with perceived impacts of the epidemic (Table 4).

Table4 Correlations of demographic, epidemic contact and concern characteristics, perceived epidemic impacts, coping style and psychological distress in all participants(n=1599) (Spearman's rank correlation)

	Gender	Age	Marriage	History of visiting Wuhan	History of epidemics occurring in the community	Concern with media reports related to the epidemic	Changes over living situations	Emotional control	Epidemic-related dreams	Coping style	Psychological distress
Demographic characteristics											
Gender	1										
Age	-0.032	1									
Marriage	-0.061*	0.768***	1								
Epidemic contact characteristics											
History of visiting Wuhan	0.039	-0.477***	-0.420***	1							
History of epidemics occurring in the community	0.031	-0.236***	-0.214***	0.257***	1						
Concern with media reports related to the epidemic	-0.004	0.017	0.006	0.130***	0.052*	1					
Perceived impacts of the epidemic											
Changes over living situations	-0.103***	-0.212***	-0.125***	0.321***	0.142***	0.229***	1				
Emotional control	-0.020	-0.411***	-0.320***	0.586***	0.219***	0.155***	0.506***	1			
Epidemic-related dreams	-0.023	-0.378***	-0.296***	0.646***	0.215***	0.199***	0.462***	0.714***	1		
Coping style	-0.065**	0.389***	0.317***	-0.525***	-0.189***	-0.088***	-0.316***	-0.577***	-0.563***	1	
Psychological distress	0.000	-0.371***	-0.301***	0.548***	0.219***	0.192***	0.571***	0.752***	0.708***	-0.573***	1

Note: *** p <0.001, ** p < 0.01, and * p < 0.05.

Discussion

The results of the study suggest that the general population with a history of visiting Wuhan, those with a history of epidemics occurring in their community, and those who perceived more severe impacts of the epidemic of COVID-19 on their living situations, emotional control, and epidemic-related dreams have a higher level of psychological distress than those with none or little of these experiences. These findings are consistent with the findings of previous studies. The traumatic stress experience during the occurrence of emergency events, such as major public events or natural disasters, is often related to the general population's psychological distress and subsequent mental illness [5,6,8].

Furthermore, the study found that there were more participants who exhibited a negative coping style (34.2%), especially among younger, single, those with a history of epidemic contact, and those who perceived severe impacts of the epidemic of COVID-19.

Other studies related to traumatic stress events have reported that those in the general population with traumatic stress experiences were more likely to adopt a negative coping style [9]. Some studies have shown that this phenomenon is related to the general population's brain functional connectivity [15], while others have shown that it is related to social support [20,21]. The underlying mechanism of this association has yet to be elucidated, which may be the result of the combined effect of the two

mechanisms. Further study is needed to confirm this hypothesis. More importantly, the study also found that the general population with negative coping styles has higher psychological distress than those with positive coping styles. Many previous studies have shown that different coping styles, especially negative coping styles, for trauma stress events are usually related to subsequent mental illness [7,10,22]. Therefore, this part of the general population with a negative coping style should be given attention and follow-up, and appropriate interventions should be given if necessary.

Finally, this study included concern with media reports related to the epidemic of COVID-19 in the analysis. Previous studies have reported that post-disaster mental health problems, such as post-traumatic stress disorder (PTSD), may be related to media reports in addition to direct exposure to the disaster environment [23,24]. The study found that with increasing concern with media reports related to epidemic, the general population's psychological distress level has also increased accordingly; this study also found that the general population's coping style was negatively related to concern with media reports. This result suggested that during the epidemic of COVID-19, the degree of concern with media reports affected the general population's psychological distress level and coping style, which might be related to that media reports could affect the general population's perceptions of the disease and what preventive measures they would take [25,26]; further research is needed to confirm this relation.

In conclusion, this study found that the epidemic of COVID-19 caused different levels of psychological distress. Those with epidemic contact characteristics, excessive concern with media reports, and those who perceived more impacts of the epidemic reported higher levels of psychological distress. The psychological distress was significantly different in general population and was significantly negatively correlated with coping style. Therefore, appropriate interventions should be implemented early to address the impacts of such epidemics, especially for those in the general population with a high level of psychological distress and/or with a negative coping style.

Limitations

There are several limitations in our study. First, the survey method is based on network invitation rather than face-to-face random sampling, and participants need to be able to use network tools. As a result, the status of the general population who cannot use network tools is unclear. Second, we did not assess whether and how respondents were engaging in prevention. Finally, our study design is cross-sectional and thus cannot capture changes in psychological distress and its predictors over the course of the COVID-19.

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