

Anxiety, Depressive Symptoms and Sense of Agency in the Chinese Quarantine Population during the COVID-19 Pandemic

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Abstract. Recent research has suggested that quarantine is associated with a change in lifestyle and an increase in mental health symptoms. This paper examines whether quarantine methods are related to a decrease in sense of agency and an increase in depressive and anxiety symptoms. The participants are 1051 Chinese across all age groups and provinces in China. This paper hypothesis that mandatory quarantine is associated with a diminished sense of agency and an increase in depressive and anxiety symptoms. Results showed that the quarantine method is negatively correlated with the sense of positive agency (SoPA) and positively linked with the sense of negative agency (SoNA). The result also suggests that a long quarantine period is associated with an increase in depressive and anxiety symptoms.

Keywords: Quarantine; COVID-19; Agency; Depression; Anxiety; Chinese.

1. Introduction

Since the outbreak of Severe Acute Respiratory Syndrome Coronavirus 2 on January 30, 2020, governments worldwide have taken drastic quarantine measures for overseas travelers to control the chain of transmission of coronavirus disease 2019 (COVID-19). According to GOV.UK [1], almost all countries now require travelers who newly enter their border to quarantine for at least 7-14 days in the form of either self-isolation or centralized quarantine. A mixed method is also observed in countries such as China, where foreign travelers' must isolate themselves both in a quarantined hotel for 14-21 days and seven days in their home or accommodation sequentially. This long period of quarantine disrupts people's access to their regular life routine. Different studies across countries have reported that quarantine led to changes in daily routine activities, such as a change in sleep habits [2], dietary habits [3,4,5], and physical activities [3,5,6]. The change in daily routine habits not only negatively affects people's lives, but it might also associate with psychological consequences.

One known consequence is that the quarantine procedures put people in stressful and depressive situations such as social isolation, limited mobility, COVID-19 information overload, and an extended period of uncertainty. According to the meta-analysis by Wu et al.[7], the quarantined population in China has a 38.8% and 57.9% prevalence for depression and anxiety, respectively, compared to 31.5% and 29.8 in the general population during the COVID-19 outbreak. A similar mental health burden was also observed in Saudi Arabia, Turkey and Iraq, in which quarantined people exhibit a higher prevalence of depression and anxiety symptoms [8,9,10]. In this respect, there is a clear correlation between the people who are being quarantined for an extended period and the presence of anxiety and depression symptoms.

A second potential consequence that has not been previously explored is that the strict quarantine enforcement rules and the drastic change in routine base lifestyle during quarantine may give rise to a sense of uncontrollability of people's lives, as they can no longer engage in regular activities they used to do or in the ways they used to be. When uncontrollability arises, people's sense of agency will start to diminish [11]. According to Synofzik et al. [12], the sense of agency (SoA) refers to "the registration that I am the initiator of my actions." A diminished sense of agency has been found correlated with an increase in depression and anxiety symptoms. As it was highlighted by Seligman et al. [13], when people experience a persistent lack of control over the consequences of their lives, depression can develop. This idea is consistent with modern-day research. For example, Obhi et al. [14] conducted an experiment to measure the association between agency and depression. They found

that when depressive memories are reactivated, participants feel a loss of control. Similar evidence is obtained in clinical populations. According to Tapel et al. [15], people with obsessive-compulsive disorder (OCD) have a weaker sense of agency. The more people suffer from OCD symptoms, the less they can control their thoughts and behaviors. More recent research also suggests that depressive women have a lower sense of agency. The researcher found that anti-depressants not only alleviate depressive symptoms but also restore patients' sense of control which suggests that depression may link to a diminished sense of control [16]. Likewise, Rapee et al. [17] developed a scale that aims to measure individuals' sense of perceived control over anxiety arousal events. Their scale provides evidence that lack of perceived control positively correlates to an increase in distress. Consistently, Jing et al.'s [18] study found that a lack of a sense of control over situations tends to exaggerate participants' feelings of anxiety.

In summary, previous studies suggest that people who are being quarantined for an extended period exhibit a greater prevalence of anxiety and depressive symptoms and may exhibit a diminished sense of agency. To my knowledge, there has been no research into the relationship between a sense of agency and the prevalence of anxiety and depression in the Chinese populace who have been or are being quarantined. Hence, the current study focuses on using the Sense of Agency Scale (SoAS) [15] to investigate the sense of agency in the mandatory quarantined population in China and to explore whether it is a potential explanation for the increased prevalence of depression and anxiety symptoms. As its name suggests, the SoAS is designed to capture people's general sense of agency [15]. The SoAS is unique in two perspectives compared to other measures with a similar objective. Firstly, the SoAS directly assesses a general sense of agency that is not context-specific. In other words, it aims to assess people's trait agency instead of the state agency. Second, the scale introduces two concepts to capture the agency cognition in the full range: the Sense of Positive Agency (SoPA) and the Sense of Negative Agency (SoNa). The SoPS refers to the feeling that one has the power over their own thoughts, actions, and the environment one chooses to be in [15]. In contrast, the SoNA is the feeling that one's mind, body, and surrounding is not under one's control [15]. As the quarantine rules in China involve the most prolonged and strictest procedures, the purpose of this research is to investigate whether SoA is correlated with a greater prevalence of anxiety and depressive symptoms in this quarantine population. The present research hypothesizes that people experiencing mandatory quarantine in China (either hotel or home or both) would exhibit a lower SoPA and a higher SoNA than the general population during their period of isolation. This paper also hypothesizes that SoNA is positively correlated with anxiety and depression whereas SoPA is negatively correlated with anxiety and depression.

2. Method

2.1 Participants

The study participants include Chinese from all age groups (18 or below to 60 or above) and from all Chinese provinces who are able to use WeChat (a widespread Chinese social media messaging app) or able to open the survey hyperlink from an electronic device. The participants were recruited through social media and can be defined into four types according to their quarantine method. Quarantine method one (Q1) includes participants who have experienced or are experiencing 14 days or more hotel centralized quarantine. Quarantine method two (Q2) includes participants who have experienced or are experiencing 7 days or more home self-isolation. Quarantine method three (Q3) includes participants who have experienced or are experiencing both Q1 and Q2 combined. Quarantine method four includes participants who have never been in any form of quarantine during the COVID-19 outbreak. In total, there were 1051 responses were collected. Excluding participants that are under 18 and higher than 60 years old, there were in total 1048 valid questionnaires were collected.

2.2 Measures

The survey was administered online by opening a WeChat QR code or clicking a hyperlink and is consisted of questions displayed in simplified Chinese. The questionnaire starts with multiple-choice questions asking the participants their background information such as “what age group do you belong to”, “have you been through or currently being quarantined and for how long” and “what is your occupation”. The rest of the questions measure the presence of symptoms (i.e. depression, anxiety, and agency). Each page of questions uses a timer (35 to 45 seconds) to ensure participants are reading the question carefully. The participants could only advance to the next page after the timer count to 0. The questions would have a slightly different version depending on whether the participants have been or are currently at quarantine or they have never been quarantined during the pandemic. If the participants have been through or are currently at quarantine, the measurement scale question would end with such as “how often have you been bothered...over the quarantine period”. If the participants have never been in any form of quarantine, the questions would end with “during the pandemic” instead.

2.2.1 Depression

The questionnaire used the Chinese version of PHQ-9 to measure depression symptoms. The Chinese version of PHQ-9 has been shown to have a dependable validity and reliability among Chinese participants in previous studies [19; 27]. The scale consisted of nine symptoms related questions and each was to respond on a 4-point Likert scale, i.e., (0) “Not at all”, (1) “Several Days”, (2) “More than half days”, (3) “Nearly everyday”. The total scores range from 0 to 27, with the higher scores positively correlating with greater severity of depression. The study uses 10-point as a cutoff score to define the presence of depression symptoms [19,20,21].

2.2.2 Anxiety

The study uses the Chinese version of GAD-7 to measure anxiety symptoms. Past research provides evidence that the Chinese version of GAD-7 has excellent reliability and validity among the Chinese participants [20]. The scale includes seven items and is rated on a 4-point Likert scale consisting of (0) “Not at all”, (1) “Several Days”, (2) “More than half days”, (3) “Nearly everyday”. The total score range from 0 to 21 with the higher scores positively correlating with greater severity of anxiety. The study uses 10-point as a cutoff score as the indication of anxiety [20,22].

2.2.3 Agency

The study uses the Chinese version of SoAS to measure sense of agency. The SoAS has been shown to have good reliability and validity in the original study [15]. Only one study tested its validity and reliability in the cross-cultural sample. Its result indicated good reliability but a very poor construct validity among the French samples [23]. The SoAS has never been translated into a Chinese version, and this is the first study to adapt the Chinese sample. The scale was translated by a professional translator and was back-translated by another professional translator to check its validity. The Chinese version of SoAS included six SoPA and seven SoNA items and was rated on a 7-points Likert Scale, i.e. (1) “Strongly disagree”, (2) “Disagree”, (3) “More or less disagree”, (4) “Undecided”, (5) “More or less agree”, (6) “Agree”, (7) “Strongly Agree”. The total score for SoPA ranges from 6 to 42. The higher the score indicates the stronger sense of agency. In contrast, the total score for SoNA ranges from 7 to 49. The higher the score indicates the weaker sense of agency.

2.3 Data Analysis

SPSS 25.0 was used for the data analysis in this study. First, descriptive statistics was used among the major variables. Next, a correlational analysis was performed to analyze the associations between the major variables. Second, the data were analyzed for the frequency among the quarantine method and different age categories. An ANOVAs analysis was later adopted for each of the four quarantine methods to examine their relationship with the major variables, and a Bonferroni post hoc criterion was used as post hoc analysis for the significances. In all analyses, $\alpha=0.05$.

3. Result

3.1 Descriptive Analysis

As it was included in Table 1, the descriptive statistic suggested that the mean PHQ9 score was $M = 16.80$, $SD = 4.48$, which showed that depression symptoms were presented in the collected samples. The mean GAD7 score was $M = 14.59$, $SD = 4.22$, which showed that anxiety symptoms were also presented in the participants. As for the SoAS score, the mean SoPA score was $M = 31.12$, $SD = 6.19$, and the mean SONA score was $M = 21.42$, $SD = 5.96$.

3.2 Correlation Analysis

As predicted, PHQ9 has a medium positive correlation with SoNA ($r = .481$, $p < .001$) and a small negative correlation with SoPA. ($r = -.347$, $p > .001$). Similarly, GAD7 was positively correlated with SoNA ($r = .426$, $p < .001$) and negatively correlated with SoPA ($r = -.339$, $p < .001$). PHQ9 and GAD7 were strongly positively correlated ($r = .766$, $p < .001$) with each other. SoNA and SoPA have a medium negative relationship ($r = -.509$, $p < .001$) with each other.

3.3 Frequency Analysis

The frequency analysis statistics for the quarantine methods suggested that “Never been in any form of quarantine” (36%) had shown to be the highest frequency and “14 days or more hotel centralized quarantine” (12.8%) had shown to be the least experienced among the participants.

In terms of the frequency of the age group, the majority of the participants (40.6%) was around 31-41 years old, followed closely by the 26-30 age groups (36.5%). Participants age below 18 (0.2%) and above 70 (0.1%) were the least frequent in this study.

Table.1 Mean and Standard Deviation of the Major Variables in Four Levels of Quarantine Methods

	Quarantine Method							
	1		2		3		4	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Mean	<i>SD</i>	Mean	<i>SD</i>
PHQ9	17.38	4.24	16.95	4.56	18.12	4.43	15.69	4.26
GAD7	14.97	4.08	14.88	4.13	15.78	4.27	13.49	4.07
SoPA	30.13	7.00	30.31	6.33	30.58	6.04	32.45	5.61
SoNA	22.76	6.48	21.76	6.21	21.94	5.98	20.34	5.38

3.4 ANOVA Analysis

3.4.1 Depression Level

Table 2 contains the ANOVA analysis of the primary variables. As the result suggested, prolonged quarantine had a significant correlation with the depression level, $F(3,1047) = 15.94$, $p < .001$. The post-hoc test showed that QM1, QM2 and QM3 participants showed significant differences in the presence of depressive symptoms with QM4 (QM1 vs. QM4: $p < .001$; $d = 0.40$, 95%CI= [0.53, 2.85]; QM2 vs. QM4: $p < .001$; $d = 0.29$, 95%CI= [0.38, 2.16]; QM3 vs. QM4: $p < .001$; $d = 0.56$, 95%CI= [-3.41, -1.26]). QM1 showed differences between QM2 and QM3, but the result was not significant. However, QM2 and QM3 showed significant differences from each other ($p = .014$; $d = -0.26$, 95%CI= [-2.18, -0.15]). This result suggests that the degree of depressive symptoms might be associated with the degree of complexity during quarantine.

3.4.2 Anxiety Level

The data showed that quarantine was significantly associated with anxiety level, $F(3, 1047) = 16.04$, $p < .001$. The post-hoc test indicated that QM1, QM2, and QM3 participants were significantly different in anxiety level than QM4 in anxiety level (QM1 vs. QM4: $p < .002$; $d = 0.36$, 95%CI= [0.38, 2.57]; QM2 vs. QM4: $p < .001$; $d = 0.34$, 95%CI= [0.55, 2.22]; QM3 vs. QM4: $p < .001$; $d = 0.55$, 95%CI= [1.37, 3.20]). QM1, QM2 and QM3 showed differences between each other, but the result was not significant.

3.4.3 SoPA Level

The ANOVA analysis showed that prolonged quarantine had a significant main effect on SoPA level, $F(3, 1047) = 9.527, p < .001$. The post-hoc test showed that QM1, QM2, and QM3 participants had a significant lower SoPA than QM4 participants (QM1 vs. QM4: $p < .001; d = -0.37, 95\%CI = [-3.94, -0.70]$; QM2 vs. QM4: $p < .001; d = -0.36, 95\%CI = [-3.38, -0.90]$; QM3 vs. QM4: $p < .002; d = -0.32, 95\%CI = [-3.23, -0.51]$). However, QM1, QM2 and QM3 did not show significant differences with each other

3.4.4 SoNA Level

The ANOVA analysis suggested that prolonged quarantine also had a significant main effect on SoNA, $F(3, 1047) = 7.491, p < .001$. The post-hoc test suggested that QM1, QM2, and QM3 participants were significantly higher in the SoNA than QM4 (QM1 vs. QM4: $p < .001; d = 0.41, 95\%CI = [0.86, 3.99]$; QM2 vs. QM4: $p = .01; d = 0.24, 95\%CI = [0.23, 2.63]$; QM3 vs. QM4: $p = .008; d = 0.28, 95\%CI = [0.29, 2.91]$). QM1, QM2 and QM3 did not show significant differences in SoNA.

Table.2 ANOVA Results

Predictors	Sum of Square	df	Mean Square	F	P
PHQ9	919.72	3	306.72	15.94	.000
GAD7	822.58	3	272.19	16.04	.000
SoPA	1067.25	3	355.75	9.52	.000
SoNA	784.86	3	261.63	7.49	.000

4. Discussion

The current study aimed to investigate the effects of prolonged quarantine on depression, anxiety, and sense of agency in the Chinese population. As hypothesized, the results suggest that Chinese participants who experienced mandatory quarantine in China either in the form of hotel quarantine, self-isolation, or both would exhibit a lower sense of SoPA and a higher sense of SoNA. The result also found that people who were required to be quarantined in China showed an increase in depression and anxiety symptoms compared to the people who had never been in any form of quarantine method which is in line with Wu et al.'s [7] finding in his meta-analysis. In addition, the second hypothesis is also supported that anxiety and depression are positively correlated with SoNA and negatively correlated with SoPA. Taken together, the present study suggests that prolonged quarantine is related to multiple psychological consequences and a diminished sense of agency in the Chinese quarantine population.

First, the current study's results provide evidence that being quarantined for a prolonged period is related to a lower sense of agency. As suggested by recent research, when people perceived that their present situation becomes uncontrollable, it decreases their SoA [11]. This explained the diminished sense of SoPA in the quarantine population in the present study. Similar to the finding in other research, people who are required to attend mandatory quarantine in China lost some degree of controllability in their routine lifestyle [2,4]. According to the most recent updated quarantine procedure in China, foreign travelers had no option on which hotel to be quarantined, how long to be quarantined, and when and how many times to receive PCR tests during their quarantine period [24]. Travelers' daily meals are also provided only by the quarantine hotel and external food is generally not allowed. Only a small percentage of hotels would allow external food delivery but only after strictly checking [24]. In other words, the routine lifestyle during the mandatory quarantine is "rearrange" by the local government and the people who are being quarantined had no control over it. This idea is also consistent with Tapal et al.'s [15] concept of SoNA that it reflects some degree of endorsement of "learned helplessness". As again travelers to China have no option and is unable to avoid the standardized quarantine procedure that is set up by the government which are also in line with the increase in SoNA in the current data.

Second, the study's data is consistent with Seligman's [13] idea that the primary prerequisites for helplessness and depression to occur are when a loss of control is attributed to "internal, stable, and

global factors” [14]. The current study result is also consistent with the previous research finding that quarantine is positively correlated with the increased risk of anxiety and depressive symptoms (Wu et al., 2021). According to previous studies, the increase in the above mental health symptoms might be explained by multiple causes. For example, Wang et al. [25] suggest that the increase in depressive and anxiety symptoms could be related to background differences such as having lower income, being younger, single, or more educated. Others suggest that it could be associated with daily routine changes such as changing sleeping patterns [2] or a lack of intense physical exercises [6]. The result of the current study provides a potential alternative explanation of the observed differences in the mental health of the quarantine population in China. As it was mentioned above, the condition of the quarantine hotel, the daily food one received, and how well they are being treated all depend on one’s “luck” after the traveler enters the “quarantine phrase” in China. One could not pick how they would be quarantined but only could follow the arrangement of the local government. Moreover, the current data suggest that the quarantine population had a diminished sense of agency in such conditions and it is correlated with the prevalence of depression and anxiety. In this regard, people who are being assigned to the “worse” conditions such as poorer hotel, food, and staff quality might raise a sense of upward social comparison to the people who are in a better condition as this allocation is out of their control. A meta-analysis and system review about the social comparison that is conducted by McCarthy and Morina [26] argue that upward comparisons have the greatest negative consequences on mental health, particularly in the context of depression and anxiety, because comparison processes feed into disordered self-perceptions. Thus, the upward social comparison might be one alternative explanation of the relationship between quarantine and mental health. However, this explanation lack data support, and future study should conduct more controlled experiments to test this relationship.

The current study included a number of limitations. First, the present study is conducted in China with Chinese participants only. The quarantine rules and procedures might be different in other countries and thus limit the generalizability of the current study results. Future studies should research on different countries with more diverse ethnicity and culture. Second, the present study uses self-report survey as the method of data collection, and thus it is still unsure if quarantine causes the observed changes of the primary variables. It is also unclear if the sense of agency causes the change in depression and anxiety or the other way around. Future studies should conduct more controlled experiments to address this issue. Also, the majority of the participants are from 26-41 years old. Future studies should include more participants from the younger and elderly groups to examine whether quarantine has a similar relationship with the agency in these age groups. Lastly, the SoAS measures agency in a non-context-specific sense. In other words, the present study examines trait agency rather than a state agency, and it is not sure if a more “quarantine context-specific” measurement of state agency, for example, a scale that developed to specific measure under quarantine circumstances, would lead to a different result. Future studies should also address this limitation.

5. Conclusion

In conclusion, the widespread COVID-19 pandemic not only imposed a great burden on physical health but also mental health. The current study suggests that mandatory quarantine might be another risk factor that leads to mental health symptoms. This research recommends that the quarantine method as a preventative procedure of the COVID-19 virus should be less restrictive as mental health is equally important as physical health and one should not trade one for the other.

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