

# The Relationship Between Fear and Anxiety Among Chinese Uninfected Residents During the Pandemic: A Conditional Process Analysis

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**Background:** This study aimed to explore the relationship between residents' COVID-19 fear and anxiety, consider whether this relationship is mediated through obsessions and the moderating role of self-efficacy on this mediating pathway.

**Methods:** This study used an online questionnaire to obtain and assess fear, obsession, anxiety and self-efficacy in 1589 Chinese COVID-19 uninfected residents. A conditional process model was used to examine the relationships between variables.

**Results:** Higher levels of fear were positively associated with obsession and anxiety. In addition, obsession was positively associated with anxiety, while self-efficacy attenuated the effect of fear on obsession and further mitigated the indirect effect of fear on anxiety through obsession.

**Conclusion:** During the COVID-19 outbreak, uninfected residents suffered varying degrees of psychological distress. COVID-19 fear may have an effect on anxiety in COVID survivors through obsession, and self-efficacy as a protective factor for individual mental health partially attenuates the effect of COVID-19 fear on obsession and the indirect effect of fear on anxiety.

**Keywords:** fear, anxiety, obsession, self-efficacy, prevention, Chinese COVID-19 uninfected residents

## Introduction

Although the COVID-19 pandemic may have ended, we still need to pay attention to the adverse effects of prolonged isolation and fear of the virus on mental health.<sup>1</sup> A significant body of research reports that the after-effects of this pandemic (such as post-traumatic stress disorder) may persist for several years.<sup>2,3</sup> Some previous survey results indicate that rates of depression, anxiety, and suicidal tendencies have continued to rise globally in the two years following the COVID-19 outbreak.<sup>4-7</sup> In China alone, a study conducted during the pandemic revealed that 53.8% of respondents reported moderate to severe impacts on their mental health due to the outbreak.<sup>8</sup> It is important to note that the psychological impact of the pandemic has shown significant differences across different countries and subgroups. Some studies suggest that residents in developing countries experience higher levels of anxiety, depression, and stress.<sup>9,10</sup>

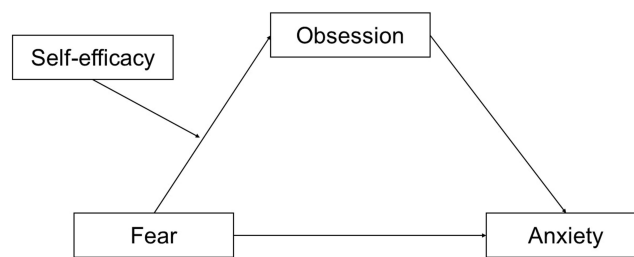
On the other hand, other research points out that younger individuals (<30 years old), individuals living alone, and individuals with pre-existing mental health conditions seemed to suffer more psychological distress during this pandemic.<sup>11-14</sup> The reasons for these variations can be considered at the societal and individual levels. At the societal level, a country's level of development and the government's response to the pandemic can indirectly influence individuals' mental health.<sup>11,15</sup> At the individual level, factors such as age, education level, and medical history may directly impact an individual's mental health.<sup>7,11,12,16</sup> However, these factors have not been comprehensively examined, which hinders the effective development of tailored psychological prevention and intervention measures based on individual and regional differences.

An increasing number of psychologists and psychiatrists are calling for a comprehensive examination of the impact of the pandemic, with reducing residents' psychological distress as one of the main objectives in rebuilding their mental health in the post-pandemic era and preventing the potential impact of future crises.<sup>17</sup> Previous research on the psychological distress caused by the COVID-19 pandemic has mainly focused on front-line healthcare workers or infected individuals, with limited exploration of the relationship between the psychological distress experienced by COVID-19 survivors and their negative emotions.<sup>18,19</sup> However, some of the latest results suggest that due to prolonged lockdowns, and uncertainty over the spread and impact of the virus, residents who were not infected during the COVID-19 outbreak also suffered from different levels of psychological distress, and some residents even experienced a significant increase in anxiety and depression in a short period of time.<sup>20</sup> Previous studies have indicated a significant association between these negative emotions resulting from lockdown measures and heightened suicidal tendencies, prompting the attention and concern of mental health experts.<sup>21</sup> Therefore, in order to provide reference for subsequent regional or global public health events and improve the effectiveness and adaptability of public health response policies and reduce the harm of the COVID-19 pandemic to individual mental health, it is very important to pay attention to and explore the relationship between the negative emotions of uninfected residents, and to explore and verify the role of different psychological protection mechanisms.

Fear and anxiety are the first observed negative emotions during the COVID-19 pandemic, and there is a strong correlation between them.<sup>22–24</sup> Fear and anxiety are considered necessary to maintain the unity and integrity of the individual's self. Although for a long time, researchers believed that fear and anxiety were indistinguishable and overlapped on a subjective level. But the latest neurobiological findings suggest that fear and anxiety are triggered by distinct neurobiological networks designed to respond to different evolutionary needs.<sup>25,26</sup> Fear is often a direct response to harm or threat, whereas anxiety is an individual's assessment of their coping abilities when faced with a challenge.<sup>26</sup> The global pandemic outbreak is the primary source of fear for everyone at this stage, and how to deal with this uncertainty crisis has undoubtedly increased the anxiety of individuals to a large extent. Some previous studies have shown that anxiety levels increase as individuals become more fearful.<sup>27</sup> After the outbreak of the pandemic, fear and anxiety have generally appeared in the public, and statistics show that high levels of fear are often accompanied by high anxiety.<sup>24,28,29</sup> However, there is still a lack of research to explore and verify their relationship and the possible mediating and regulatory mechanisms.<sup>30</sup> Therefore, this study will mainly focus on and explore the relationship between COVID-19 fear and anxiety in COVID-19 survivors during the pandemic, assuming that COVID-19 fear positively predicts individual coronavirus anxiety.

Obsessive-compulsive thoughts, one of the main symptoms of obsessive-compulsive disorder, are recurring, persistent, uncontrollable thoughts or urges in an individual, usually about harm, threat, and risk, that tend to trigger anxiety and are associated with intrusiveness.<sup>31,32</sup> Previous multi-country studies have consistently shown that individuals experience varying degrees of compulsive thinking or compulsive behaviors due to the COVID-19 pandemic, regardless of whether they have ever been diagnosed with OCD.<sup>33,34</sup> And the pandemic's uncertainty, unpredictability, fear and stress are the main reasons for the high prevalence of new compulsive thinking and compulsive behavior.<sup>32,35</sup> However, to our knowledge, current research does not explicitly explore the relationship between fear, obsessions, and anxiety. Therefore, based on the above findings, we explore and hypothesize that obsession is a mediating factor between fear and anxiety in this study, and fear increases an individual's risk of developing anxiety to a certain extent through obsessions.

Lockdowns have proven to be the best way to deal with the rapid spread of the virus, and various levels of lockdowns have been adopted around the world after the outbreak of COVID-19. On the one hand, these measures have blocked the spread of the virus; on the other hand, they have had a specific impact on individual psychology. While some studies have indicated that government responses to COVID-19 have partially alleviated depression symptoms in some populations,<sup>15</sup> more research results suggest that prolonged lockdowns have hindered individuals from engaging in regular social interactions and accessing psychological support from their previously stable social networks. In such circumstances, individuals are left to rely on their internal psychological resources to cope with the psychological distress caused by the pandemic and lockdown measures.<sup>20,36</sup> Self-efficacy is people's beliefs about their ability to cope with and control negative events and is an essential internal psychological resource for individuals.<sup>37</sup> According to social cognitive theory, in the face of sudden stressful events, an individual's self-efficacy can positively influence them to produce more positive



**Figure 1** Fear-Obsession-Anxiety Hypothesis Test Model.

coping strategies and behaviors by influencing motivation, emotion, and cognitive evaluation.<sup>38</sup> Bandura believes that self-efficacy is negatively related to stress-related negative emotions and positively related to psychological resources such as resilience and perseverance, indicating that it positively affects negative situations.<sup>39</sup> This view has also been confirmed in studies related to the COVID-19 pandemic, such as a newly published longitudinal study on the impact of self-efficacy shows that individuals with high self-efficacy tend to be able to maintain stable positive emotions and lower levels of negativity after prolonged lockdowns.<sup>40</sup> Based on social cognitive theory and the above findings, we hypothesized that self-efficacy could moderate the effect of fear on obsession, and this moderating effect further influences the indirect effect of fear on anxiety through obsession.

In conclusion, this study examines the relationship between fear and anxiety among uninfected residents during the COVID-19 outbreak and the conditional process model that may exist between the two relationships. The purpose is to make up for the current lack of attention to the impact of COVID-19 on the mental health of uninfected people, as well as the insufficient understanding of the relationship between fear and anxiety. We developed the following three assumptions and plotted the conditional process model (Figure 1).

Hypothesis 1 (H1): The higher the fear of COVID-19, the more anxious the survivor of COVID-19;

Hypothesis 2 (H2): Obsession mediates the relationship between COVID-19 fear and anxiety in uninfected residents;

Hypothesis 3 (H3): Higher self-efficacy attenuates the effect of COVID-19 fear on obsession and further attenuates the indirect effect of fear on anxiety through obsession.

## Materials and Methods

### Participants

Early in the COVID-19 pandemic outbreak (May 2020), we conducted a cross-sectional survey study recruiting participants in Jilin Province, China, using a convenient sampling approach. Recruiting was based on adult residents aged 18 and older, without cognitive impairment, who could use a smartphone for independent operation and were not infected with the coronavirus. To avoid exposure to infection, the researchers distributed electronic questionnaires to participants through a social platform (WeChat). Before the study, we informed all participants of the purpose and use of this anonymous study and their rights. All participants signed an informed consent form before answering the questions. A total of 1713 residents participated in this study. After excluding those who did not meet the inclusion criteria (<18 years old) and invalid responses (missing questions or answering less than 3 minutes), we obtained 1589 valid data, with a data recovery rate of 92.8%. The age range of participants in the final sample was 18–75 years ( $M=34.34$ ,  $SD=12.37$ ), and 1080 (68%) were female.

### Assessment and Measurement

#### Independent Variable

Residents' fear of the COVID-19 pandemic is measured using the COVID Fear Scale.<sup>41</sup> The scale consists of 7 items, and each is scored on a 5-point scale. The overall score is between 0–35, with higher scores indicating higher fear of COVID-19. The Cronbach's alpha for the scale in this study was 0.92.

## Dependent Variable

Participants' anxiety caused by coronavirus-related information and thoughts over the past two weeks was measured using the 5-term Coronavirus Anxiety Scale (CAS).<sup>42</sup> The scale uses a 5-point Likert scale from 0 to 4, with a total score between 0 and 25, with higher scores indicating higher anxiety levels. The Cronbach's alpha measured in this study was 0.88.

## Mediating Variable

To measure residents' obsession with COVID-19, we used The Obsession with COVID-19 Scale (OCS).<sup>43</sup> The scale OCS includes a total of 4 items, and the items are rated on a 5-point Likert scale, with a total score ranging from 0 to 20. The score indicates the frequency and degree of obsessive thinking about content that respondents have experienced in the past two weeks due to the COVID-19 pandemic. In this study, the Cronbach's alpha for this scale was 0.79.

## Moderator

Residents' self-efficacy was measured using the Chinese version of the General Self-Efficacy Scale (GSES), which contains 10 questions, all 4-point Likert scales.<sup>44,45</sup> The total self-efficacy score is the sum of the scores of 10 items. The score forecast indicates that the stronger the respondents' self-efficacy, the more confident they are. In this study, Cronbach's alpha for this scale was 0.93.

## Covariates

In this study, participants primarily reported the following demographic information: age, gender (1=male; 2=female), and living alone during the COVID-19 pandemic (yes/no).

## Statistical Analysis

First, we performed a standard method bias test on the data using SPSS 24.0 and performed descriptive and Pearson correlation analyses of the main study variables and covariates. Secondly, we used the PROCESS macro 3.3 written by Hayes<sup>46</sup> to carry out the verification analysis of the mediation model and the conditional process model (the regulated mediation model) successively. This macro is one of the most widely used statistical tools to detect whether the mediator effect value is adjusted. According to the suggestion of Preacher et al<sup>47</sup> and Edwards & Lambert,<sup>48</sup> when the bootstrap method is used to simulate the repeated sampling of the sample ( $n=1589$ ), the confidence interval of the 95% deviation of the value obtained does not contain zero. In the further simple slope analysis results, there is a difference in the mediating effect value under one standard deviation of the moderator variable. The mediation pathway can be considered to be regulated.

The bootstrap analysis used in the data analysis of this study is to obtain 95% bias-corrected confidence intervals by simulating 5000 repeated samplings. An effect is significant if the upper and lower bounds of the confidence interval (*CI*) for an effect do not include zero.

## Results

### Common Method Bias Test

Since the data in this study are all from questionnaires, we require respondents to answer the questionnaire anonymously to reduce the possible errors caused by a single self-report method. Statistically, Harman's univariate test was used to test whether the data involved in this study had common method bias. The results show that there are 3 factors with eigenvalues greater than 1 involved in this study, and the variance explanation rate of the first factor is 28.44% ( $< 40\%$ ), indicating that there is no serious common method bias in this study.<sup>49</sup>

### Initial Analysis

Descriptive statistics and bivariate correlations between all study variables and covariates are shown in Table 1. According to the scoring criteria proposed by Lee,<sup>42,43</sup> 8.8% of respondents in this study reported high levels of coronavirus anxiety ( $CAS \geq 9$ ), and 11.1% reported excessive obsession with COVID-19 ( $COS \geq 7$ ). In addition, the correlation matrix showed that fear was significantly positively correlated with obsession and anxiety and negatively

**Table 1** Descriptive Statistics and Bivariate Correlations Between All Study Variables and Covariates

Variable	Mean	SD	1	2	3	4	5	6
Age	34.34	12.37						
Gender	1.68	0.47	0.10**					
Whether live alone	1.81	0.39	-0.13**	-0.02				
Fear	15.54	6.66	0.20**	0.17**	-0.08**			
Obsession	4.84	1.80	0.07**	0.01	-0.02	0.45**		
Anxiety	5.91	2.21	0.09**	0.03	-0.05*	0.45**	0.69**	
Self-efficacy	26.00	6.99	0.09**	-0.08**	-0.03	-0.05*	-0.05	-0.02

Notes: \* $P < 0.05$ , \*\* $p < 0.01$ . N = 1589. Whether live alone 1 = yes, 2 = no; Gender 1 = male, 2 = female.

correlated with self-efficacy; obsession was significantly positively correlated with anxiety. On the other hand, the covariate age was significantly and positively correlated with the study variables (fear, obsession, anxiety, and self-efficacy); Gender is positively correlated with fear and negatively correlated with self-efficacy; Living alone was negatively correlated with both fear and anxiety. It is necessary to include the above covariates in further mediation analysis and conditional process model testing.

## Mediating Effect Analysis

The SPSS macro PROCESS developed by Hayes<sup>46</sup> was used to verify the mediating dictation of obsession in the relationship between residents' fear and anxiety (Model 4). The results showed that the indirect effect of fear on anxiety through obsession was significant, the mediating effect index was 0.29 (95% CI = [0.24, 0.17],  $p < 0.01$ ), and the mediating effect accounted for 63.69% of the total effect. Fear had a certain direct effect on anxiety ( $\beta = 0.17$ ,  $t = 8.04$ , 95% CI = [0.13, 0.21],  $p < 0.01$ ). Therefore, residents' fear of COVID-19 is an influencing factor of coronavirus anxiety, and this effect is mediated by obsession, and the results support hypothesis (H1, H2).

## Conditional Process Model Analysis

Table 2 shows the results based on the above research results of further conditional process model analysis using the SPSS macro PROCESS. Specifically, after controlling for covariates (age, sex, and living alone), we examined whether the first half of the mediating pathway of fear-obsessed anxiety was mediated by self-efficacy. The first regression equation results show that residents' fear has a significant effect on obsession ( $\beta = 0.47$ ,  $t = 20.46$ , 95% CI = [0.43, 0.52],  $p < 0.01$ ); The interaction of fear and self-efficacy significantly negatively affects obsession ( $\beta = -0.06$ ,  $t = -3.00$ , 95% CI =

**Table 2** Results of Further Conditional Process Model Analysis

Predictor Variable	Predicted Variable							
	Obsession (Mediator)				Anxiety (Dependent Variable)			
	$\beta$	SE	t	B Ca CI	$\beta$	SE	t	B Ca CI
Fear	0.47	0.02	20.46**	[0.43, 0.52]	0.17	0.02	8.04**	[0.13, 0.21]
Obsession					0.62	0.02	30.92**	[0.58, 0.66]
Self-efficacy	-0.04	0.02	-1.81	[-0.09, 0.01]				
Fear × Self-efficacy	-0.06	0.02	-3.00**	[-0.10, 0.02]				
Age	-0.01	0.02	-0.40	[-0.05, 0.04]	0.01	0.02	0.43	[-0.03, 0.04]
Gender	-0.18	0.05	-3.64**	[-0.27, -0.08]	-0.01	0.04	-0.15	[-0.08, 0.07]
Whether live alone	0.04	0.06	0.62	[-0.08, 0.15]	-0.07	0.05	-1.54	[-0.16, 0.02]
$R^2$	0.22				0.50			
F (df)	73.34** (6, 1582)				321.52** (5, 1583)			

Notes: \*\* $P < 0.01$ . N = 1589.

Abbreviation: SE, standard error.

**Table 3** Estimated Conditional Indirect Effect Fear → Obsession → Anxiety at Different Values of Self-Efficacy

		$\beta$	Boot SE	Boot LLCI	Boot ULCI
Estimated mediation effect	−1 SD Self-efficacy	0.33	0.05	0.24	0.42
	Average Self-efficacy	0.29	0.04	0.22	0.36
	+1 SD Self-efficacy	0.25	0.04	0.18	0.33

**Notes:** N = 1589.

**Abbreviations:** SD, Standard Deviation; SE, standard error; LLCI, Lower level of confidence interval; ULCI, upper level of confidence interval.

[−0.10, 0.02],  $p < 0.01$ ). Regression Equation 2 shows that both fear and obsession have an effect on anxiety ( $\beta=0.17$  and 0.62,  $t=8.04$  and 30.92, 95% CI = [0.13, 0.21] and [0.58, 0.66],  $p < 0.001$ ).

Further bias-corrected bootstrapping analysis showed that the indirect effects of fear on anxiety through obsession were different at different levels of self-efficacy. As shown in Table 3, regardless of whether the self-efficacy is low or high, the indirect effect of fear on anxiety is significant. The difference is that the indirect effect of fear on anxiety is stronger with low self-efficacy (−1 SD), and the indirect effect of fear on anxiety was partially attenuated by high self-efficacy (+1 SD).

The above findings suggest that obsession among uninfected residents during the COVID-19 pandemic mediates the relationship between fear and anxiety. This mediating effect of obsession was negatively moderated by self-efficacy (first-stage moderation), supporting hypothesis (H3).

## Discussion

The purpose of this study is to focus on and explore the impact of this global pandemic on the mental health of COVID-19 survivors (fear, anxiety and obsession), to examine the direct and indirect effects of COVID-19 on anxiety through obsessions and whether these effects are mediated by self-efficacy. On the one hand, we found through a large sample survey study that the high rate of anxiety and excessive obsession among uninfected residents during the COVID-19 pandemic reached 8.8% and 11.1% respectively. This result is higher than that in Korea during the same period (N = 329, CAS = 3.3%, OCS = 5.5%)<sup>50</sup> and Turkey (N = 763, CAS = 3.8%).<sup>51</sup> Survey data obtained using the same scale in adults demonstrate the importance and necessity of paying attention to the negative emotions of Chinese COVID-19 survivors.

The psychological responses of individuals to the pandemic are influenced by various demographic factors such as gender and age.<sup>52</sup> The results of this study indicate that, during the current pandemic, the age of uninfected residents in China is significantly correlated with anxiety and obsession. Compared to younger individuals, older adults have experienced more negative effects during this pandemic, displaying higher levels of anxiety and obsession. Surprisingly, in this study, participants' gender was not significantly associated with their anxiety and obsession, contrary to previous research conducted in other countries such as Italy and France.<sup>53,54</sup> This discrepancy may be attributed to differences in sample characteristics and sociocultural backgrounds. Future research should involve larger cross-cultural samples to explore the underlying reasons for these differences. Furthermore, there is a need for further research that comprehensively examines the influence of participants' demographic factors and environmental factors on individuals' psychological well-being during major stress events like pandemics. Such research will provide a more robust theoretical foundation for the development of targeted prevention and intervention measures.

On the other hand, the results of this study support our main hypothesis. First, the findings establish a positive association between COVID-19 fear and anxiety. This means that individuals with high fear tend to be accompanied by high anxiety levels, which is consistent with previous findings in other groups.<sup>30</sup> While the current cross-sectional study results cannot infer whether there is a causal relationship between fear and anxiety. However, from a statistical point of view, the results of regression tests are directional. Therefore, our findings somewhat support the hypothesis that fear positively affects anxiety (H1).



Moreover, the findings again underscore the significance and necessity of preventing and alleviating residents' fears during pandemics, which play a crucial role in further interventions and mitigating the psychological distress caused by such outbreaks. Second, after controlling for age, gender and whether they lived alone, the direct effect of fear on anxiety and the indirect effect through obsession was significant. We validated our previous hypothesis that obsession mediates the relationship between fear and anxiety (H2). Previous research findings were mainly about the pairwise relationship between fear and obsession, obsession and anxiety, and fear and anxiety, with limited exploration of their comprehensive relationship. Our study results partially address this gap in the field and provide a solid theoretical foundation for future preventive and intervention efforts. Finally, our findings show that self-efficacy negatively moderates the effects of fear on obsession, and this moderating effect further influences the indirect effect of fear on anxiety through obsession, validating and supporting our proposed conditional process model (H3). Specifically, individuals with high self-efficacy were more able to maintain emotional stability during the pandemic and fewer obsessions and anxiety due to fear of COVID-19. The results of this study validate the social cognitive theory<sup>38</sup> and self-efficacy models.<sup>55,56</sup> The effectiveness during the COVID-19 outbreak supports previous research conclusions that self-efficacy as a protective factor for individual psychology can effectively alleviate the psychological distress caused by the COVID-19 pandemic.<sup>57</sup>

The above findings not only reiterate the significant impact of the current pandemic on residents' mental health but also highlight the vulnerability of residents' psychological resilience during crises, emphasizing the necessity of developing a nationwide psychological intervention plan. Cognitive Behavioral Therapy (CBT) has been widely used in various psychological interventions during this pandemic, and numerous empirical studies have demonstrated its significant effectiveness in reducing negative emotions and insomnia associated with COVID-19.<sup>58</sup> Internet-delivered Cognitive Behavioral Therapy (I-CBT) has been extensively applied in countries like China and Singapore during lockdown periods, overcoming limitations of time and location, and its efficacy has been well-established through multiple validations.<sup>58–61</sup> These successful cases provide valuable insights for future intervention plans to address the psychological distress caused by crises. Governments and relevant agencies should prioritize the role of CBT in crisis psychological interventions and leverage emerging technologies such as the Internet to develop more widespread, convenient, and efficient psychological intervention programs for the public.

As mentioned earlier, some limitations of this study as a cross-sectional study should be considered when discussing and evaluating the above findings. First, since our findings came from a cross-sectional study, we cannot make any causal inferences about the relationship between fear and anxiety among Chinese residents infected with COVID-19. Therefore, further follow-up investigations are needed to verify and expand the conditional process model proposed in this study. Second, since the study was conducted during a large-scale outbreak of COVID-19, research limited by public distancing measures of the COVID-19 pandemic, participants can only be recruited through social networks by convenience sampling. Although a large sample size was obtained, this sampling method may not cover all populations (for example, older people without mobile phones, etc.), limiting the sample's representativeness and diversity to some extent. Finally, survey research using only self-report methods is often subject to potential bias (eg, participant volatility may be influenced by factors such as social expectations). We suggest that methods such as a combination of others and self-reports can be used in future research to reduce this bias.

Despite these limitations, the results of this study are robust and support the use of fear as a related factor for anxiety in residents uninfected by COVID-19. And these results found that obsession may serve as a potential mechanism for fear and anxiety. In addition, the results of this study further reveal that the mediating effect of obsession is mediated by self-efficacy. It is suggested that maintaining a high level of self-efficacy in the face of public health emergencies can often weaken the direct and indirect effects of fear on anxiety. The above findings have both theoretical and practical significance for preventing and reducing the harm of the COVID-19 pandemic to individual psychology.

## Conclusion

This article explores and describes the effect of fear on anxiety among uninfected residents during the covid-19 outbreak. The results suggest that residents' fear of COVID-19 increases the risk of developing anxiety through obsession, and the level of individual self-efficacy moderated this mediating effect. Therefore, health departments need to pay attention to the negative emotions of COVID-19 survivors, intervene in a timely manner, release timely and effective information,

carry out relevant popular science activities, etc. Raise residents' scientific awareness of the pandemic and reduce public fears about COVID-19. In addition, at the individual level, residents should recognize that improving self-efficacy is conducive to maintaining positive emotions, reducing and alleviating the positive effects of individual obsessions and anxiety caused by fear of COVID-19, and consciously increasing self-efficacy. At the societal level, facing possible future public health emergencies, we should focus more on individuals with low self-efficacy and implement intervention measures to alleviate their potential psychological distress. Finally, in the post-pandemic new normal era, comprehensively understanding and mitigating "COVID-19 psychological after-effects" is one of the main tasks. Some issues, such as COVID-19 burnout,<sup>62</sup> have severely impacted the recovery of social production, and more research is needed to characterize and develop intervention programs to address these sequelae.

## Ethical Approval

This study was reviewed and approved by the Ethics Committee of Jilin University. The study followed the principles of the Declaration of Helsinki. All participants were requested to read and sign the informed consent form before starting this study.

## Funding

This study was supported by the National Social Science Foundation of China (15BSH087). Yang Sun completed the writing and revision of the manuscript during her PhD, which was funded by the China Scholarship Council (No.202106170007).

## Disclosure

The authors report no potential conflicts of interest in this work.

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