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Mediating Role of Viral Anxiety and Insomnia in Relationship Between Work-Related Stress and Depression Among Cold Chain Workers During COVID-19 Pandemic

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ABSTRACT

Background: Here we investigated whether cold chain workers' insomnia, work-related stress, and viral anxiety contributed to their depression. Furthermore, we investigated the role of viral anxiety in mediating the association between work-related stress and depressive symptoms.
Methods: All 200 invited cold chain workers voluntarily responded to an online survey. All were working at a market in Taiyuan, Shanxi Province, China, and responsible for testing nucleic acids in imported cold chain foods and disinfecting outer packaging at government request. We collected their demographic variables and rated their symptoms using the Stress and Anxiety to Viral Epidemics-6 Items (SAVE-6), Patient Health Questionnaire-9, Insomnia Severity Index (ISI), Perceived Stress Scale (PSS), and Maslach Burnout Inventory - General Survey (MBI-GS).
Results: Cold chain workers' depression was significantly correlated with higher SAVE-6 (r = 0.450, $P < 0.01$), ISI (r = 0.603, $P < 0.01$), MBI-GS (r = 0.481, $P < 0.01$), and PSS (r = 0.390, $P < 0.01$) scores. SAVE-6 score was significantly correlated with ISI (r = 0.462, $P < 0.01$), MBI-GS (r = 0.305, $P < 0.01$), and PSS (r = 0.268, $P < 0.01$) scores. Linear regression revealed that their depression was predicted by SAVE-6 (β = 0.183, $P = 0.003$), ISI (β = 0.409, $P < 0.001$), and MBI-GS (β = 0.236, $P = 0.002$, adjusted R^2 = 0.440, F = 40.04, $P < 0.001$) scores. Mediation analysis showed that their burnout directly influenced their depression, while viral anxiety or insomnia severity mediated the influence of burnout on depression.
Conclusion: The study showed that burnout was a direct cause of depression and that viral anxiety and insomnia severity mediated the relationship between burnout and depression.

Keywords: COVID-19; Stress; Anxiety; Cold Chain Workers

INTRODUCTION

Coronavirus disease 2019 (COVID-19), an acute respiratory infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, was discovered at

the end of 2019 and is the most severe health crisis in a century. Because of its highly variable, highly infectious, and highly pathogenic and other characteristics, the COVID-19 pandemic is still far from over.[1] Although many countries have declared the end of the acute phase of the COVID-19 pandemic, the long-term psychological damage it caused has not completely disappeared and public awareness is lacking. March 11, 2023 marks 3 years since the World Health Organization declared the COVID-19 outbreak a pandemic.[2] Previous psychological studies of large-scale epidemics demonstrated the devastating effects of the pandemic on people's mental health will continue for a long time, especially among vulnerable groups.

The joint international team described that viral introduction through cold/food chain products is a possible pathway.[3] China experienced some outbreaks related to imported frozen products in 2020,[4] thereby identifying cold chain personnel as among the most vulnerable occupational groups. Workers in the cold chain industry are exposed to occupational risks and job stress due to extreme temperatures, manual labor, and exposure to hazardous materials. In addition to the physical risks, cold chain workers experience challenges related to their socioeconomic status and working conditions.[5,6] Workers in disadvantaged positions may have limited access to personal protective equipment and healthcare resources, which may contribute to their risk of COVID-19 infection and transmission. Additionally, poor working conditions may exacerbate existing health conditions and increase the risk of infection. Cold chain workers have assumed increasing responsibilities in response to the COVID-19 pandemic; however, they have historically received less attention than healthcare workers or infected patients. The Chinese government has implemented strict policies to prevent and control cold chain food contamination. As a consequence, cold chain workers are under increased pressure to ensure the safety and quality of temperature-sensitive products and comply with evolving regulatory requirements. Two recent studies[7,8] from China reported high levels of psychological distress during the pandemic and suggested the need for more attention to vulnerable groups. Therefore, the mental health of cold chain workers is worthy of attention during the pandemic.

Depression is currently the most commonly diagnosed psychiatric disorder worldwide.[9,10] Many studies have shown that the prevalence of depressive symptoms has increased during the COVID-19 pandemic. For example, Ettman et al.[11] noted that the prevalence of depression among US adults was 24.7% before the pandemic and 52.4% during the pandemic. Another study in China shows that about half (50.4%) of surveyed healthcare workers reported experiencing symptoms of depression during the pandemic.[9] It is worth noting that depression is a disabling illness that is often accompanied by worsening health status and a high risk of suicide[12-14]; thus, we should be more attentive to the factors associated with depression during the pandemic.

One study reported that depression was frequently linked to other negative feelings, including anxiety and stress.[15] Anxiety is a natural reaction of the body to future threats or dangers and can be an important determinant of depression. Rodríguez-Rey et al.[16] reported that anxiety was a significant predictor of depressive symptoms during the pandemic among a non-clinical population. Other research suggests a mediating role for anxiety in the association between depression, fear, and stress.[17]

Perceived stress is a person's appraisal of the level of threat from stressors as well as their ability to cope with the threat.[18] When the threat level of a stressor is much higher than one's ability to respond to the threat and remains uncontrolled for a long period of time, health

damage can result. The stressors associated with the COVID-19 pandemic are innumerable, including a fear of becoming ill and dying, worries about infecting others, the grief associated with the loss of loved ones, loneliness from social isolation from family and friends, and anxiety about losing jobs, businesses, and income. In addition, the increasing numbers of COVID-19 infections and mortality have escalated stress during the pandemic, which can produce many mental health problems such as insomnia, anxiety, depression and burnout.[19] COVID-19 stress predicted COVID-19 burnout and classified stress as a predicate for burnout.[20]

Burnout is defined as a state of physical, emotional, and mental exhaustion that is a prolonged response to chronic stressors.[21] The phenomenon of physician burnout was adequately studied in hospital settings and has a direct negative impact on anxiety, depression and insomnia, among others.[22] At present, burnout syndrome has been extensively studied, but less so in the cold chain population. The cold chain population has faced intense workloads and inappropriate working conditions during the outbreak that can lead to burnout. Research has shown that burnout symptoms are significantly predictive of depressive symptoms.[23]

Stress, anxiety, and depression have been associated with sleep problems during COVID-19,[24] and their elevated levels may significantly disrupt sleep.[25] A study among Chinese college students showed that COVID-19-related stress was positively associated with poor sleep quality.[26] Insomnia is also reportedly associated with an increased risk of depression.[27] Insomnia mediated the association between perceived stress and depression.[18] Although the relationship between sleep and mood disorders is complex, sleep problems precede depression to some extent.[28]

After reviewing the emerging literature on mental health during the COVID-19 pandemic, we found that the complex relationship between anxiety, perceived stress, burnout, and insomnia play an important role in the development of depressive symptoms, which is also supported by many published papers, but such investigations have rarely been studied in cold chain populations. Some studies suggested that individual demographic characteristics play an important role in explaining burnout syndrome.[29] Therefore, we hope that the study of the mental health status of the cold chain population can help many unnoticed populations with similar demographic characteristics, such as higher age, lower education level, and higher risk of exposure or infection in the face of epidemics.

Here we investigated whether cold chain workers' insomnia, work-related stress, and viral anxiety contributed to their depression. Furthermore, we investigated the role of viral anxiety in mediating the association between work-related stress and depressive symptoms. According to previous studies, we hypothesized that work-related stress would negatively influence depression, viral anxiety would positively influence depression, and viral anxiety would at least partially mediate the influence of work-related stress on depression among cold chain workers during the COVID-19 pandemic.

METHODS

Study design

This online survey study was conducted via the Wenjuanxing platform, a widely used web-based survey tool in China. The present study used a cross-sectional design, and from May

to June 2022, the survey link was pushed to some WeChat groups of cold chain food workers who also participated in cold chain food nucleic acid testing. No rewards were provided to the participants. The participants were informed about the purpose of the study and anonymously responded it when they agreed that their responses will be used for scientific purposes. The question "Do you voluntarily participate in this study?" was the first question, and the respondent agreed to continue to answer; otherwise, the question was closed. The participants were allowed to terminate the survey at any time.

Participants

The questionnaire was voluntarily completed by 200 cold chain workers, and we analyzed the data collected at a market in Taiyuan, Shanxi Province, China, responsible for testing nucleic acids in imported cold chain foods and disinfecting outer packaging at government request. The inclusion criteria: age ≥ 18 years; engagement in work related to the cold chain process; ability to use a phone; and voluntary participation in the study. The exclusion criterion was an unwillingness to participate. In this study, cold chain food workers were defined as individuals who work in close contact with frozen food, including frozen food sellers, sterilization testers, delivery workers, and managers. We collected the participants' age, sex, marital status, education level, job duties, time worked in the cold chain industry, average daily working hours, whether they had been exposed to positive foods, protective equipment used at work, and whether they experienced social isolation.

Symptom rating scales

Stress and Anxiety to Viral Epidemics-6 (SAVE-6) Items
The SAVE-6 scale is a tool that was developed to measure an individual's level of viral anxiety.[30] The SAVE-6 is derived from factor I of the SAVE-9 scale,[31] which is used to assess work-related stress and viral anxiety among healthcare workers. The scale contains six items rated on a five-point Likert scale with options ranging from 0 (never) to 4 (always). The total score is 0–24, with a higher score indicating a higher level of viral anxiety. To ensure the scale was appropriate for the Chinese context, we translated it into Chinese (Mandarin) using a translation and back-translation method. The Chinese version of the SAVE-6 has now been validated[32] and shown to be applicable to the cold chain population with good reliability. A score of 15 was used as the cut-off level to separate anxiety symptoms in the general population. The Cronbach's alpha of this sample was 0.925.

Patient Health Questionnaire-9 (PHQ-9)
The PHQ-9 is a tool used to measure the severity of depression in individuals.[33] It consists of nine items rated on a four-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). The total score is 0–27, with a higher score indicating more severe depression. This study used the Chinese version of the PHQ-9 scale.[34] The Cronbach's alpha of this sample was 0.930.

Insomnia Severity Index (ISI)
The ISI uses seven items to evaluate insomnia severity.[35] Each item is rated on a five-point Likert scale (0 = no problem, 4 = very serious problem), yielding a total of 0–28. There are four levels of insomnia on the scale: no insomnia (0–7), sub-threshold insomnia (8–14), moderate insomnia (15–21), and severe insomnia (22–28). The Chinese version of the ISI scale was applied.[36] The Cronbach's alpha of this sample was 0.741.

Perceived Stress Scale (PSS)
The PSS is a self-reported scale that measures the perceived severity of stress.[37] This

questionnaire contains 14 items, each rated from 0 (rarely) to 4 (very often) on a five-point Likert scale. The questionnaire contains six negative statements and four positive statements. The total PSS score is 0–40. A higher score indicates a greater degree of subjective stress. In this study, we used the Chinese version of the PSS.[38] The Cronbach's alpha of the sample was 0.881.

Maslach Burnout Inventory - General Survey (MBI-GS)
The MBI-GS is a tool used to assess burnout among medical personnel.[39] The MBI-GS consists of three dimensions: emotional exhaustion (EE), depersonalization, and personal accomplishment. In this study, the Chinese version of the MBI-GS was utilized. A higher total score indicates a higher degree of burnout. The Cronbach's alpha of this sample was 0.893.

Statistical analysis
The patients' clinical characteristics are summarized as mean ± standard deviation. A two-tailed significance level of $P < 0.05$ was used for all analyses. To explore the factors influencing cold chain workers' depression, χ^2 tests were used to compare differences in demographic factors such as sex, marital status, job duties, or COVID-19-related questions between depressed and non-depressed groups. To examine the relationships between SAVE-9, PSS, MBI-GS, ISI, and PHQ-9, Pearson's correlation analysis was used. To identify variables that predict high levels of depression, a logistic regression analysis was performed. In addition, 2,000 resamples were used to determine whether insomnia or viral anxiety may mediate the effect of psychological status on depression among cold chain workers. The statistical analysis was conducted using SPSS 21.0 for Windows (IBM Corp., Armonk, NY, USA).

Ethics statement
The study protocol (2022008) was approved by the Institutional Review Board of Taiyuan Central Hospital, which waived the requirement for written informed consent.

RESULTS

All 200 responses of the cold chain workers were collected (**Table 1**). Among them, 56.5% were male, 70.5% had an education level of high school or below, 51% had been working in the cold chain industry for more than 5 years, 30.5% had not received systematic training on COVID-19 protection knowledge, 13% were exposed to positive cold chain foods, and 15.5% experienced social isolation. Detailed demographic information is shown in **Table 1**.

Cold chain workers' depressive symptoms measured with the PHQ-9 was significantly correlated with higher SAVE-6 (r = 0.450, *P* < 0.01), ISI (r = 0.603, *P* < 0.01), MBI-GS (r = 0.481, *P* < 0.01), and PSS (r = 0.390, *P* < 0.01) scores (**Table 2**). SAVE-6 scores were significantly correlated with ISI (r = 0.462, *P* < 0.01), MBI-GS (r = 0.305, *P* < 0.01), and PSS

Table 1. Demographic characteristics of participants (n = 200)

Variables	Value
Male sex	113 (56.5)
Age, yr	
18–25	17 (8.5)
26–35	63 (31.5)
36–45	76 (38.0)
46–55	39 (19.5)
> 56	5 (2.5)

(continued to the next page)

Table 1. (Continued) Demographic characteristics of participants (n = 200)

Variables	Value
Educational level	
Primary school or below	10 (5.0)
Middle school	56 (28.0)
High school	75 (37.5)
University or above	59 (29.5)
Marital status	
Single	33 (16.5)
Married	163 (81.5)
Divorced or widowed	4 (2.0)
Job title	
Frozen food seller	102 (51.0)
Frozen food sterilization tester	9 (4.5)
Frozen food delivery workers	51 (25.5)
Frozen food managers	38 (19.0)
Time engaged in work, yr	
< 5	98 (49.0)
5–10	49 (24.5)
> 10	53 (26.5)
Daily working hours, hr	
< 7	13 (6.5)
7–9	150 (75.0)
> 9	37 (18.5)
Sleep duration per night, hr	
< 7	45 (22.5)
7–9	152 (76.0)
> 9	3 (1.5)
Living with family	
Yes	172 (86.0)
No	28 (14.0)
Are you now or have you ever used anti-anxiety or anti-depression medication?	
Yes	9 (4.5)
No	191 (95.5)
What protective equipment do you use in your work process? (multiple choice)	
Medical surgical masks	197 (98.5)
Medical disposable gloves	133 (66.5)
Medical disposable protective clothing/isolation clothing	59 (29.5)
Disposable protective face screen/goggles	38 (19.0)
Disposable shoe covers	37 (18.5)
Working cap	42 (21.0)
What do you think of the risk level of infection of your work process?	
Low risk	114 (57.0)
Medium risk	62 (31.0)
High risk	24 (12.0)
Viral transmission via cold chain	
Possible	115 (57.5)
Uncertain	63 (31.5)
Unlikely	22 (11.0)
COVID-19 questions	
Have you been diagnosed with COVID? (Yes)	0
Have you been exposed to frozen products infected with COVID-19? (Yes)	26 (13.0)
Have you experienced quarantine? (Yes)	31 (15.5)
Have you received training on COVID-19 protection? (Yes)	139 (69.5)
Rating scale scores	
Stress and Anxiety to Viral Epidemics-6	11.6 ± 7.0
Patient Health Questionnaire-9	4.0 ± 5.1
Insomnia Severity Index	12.9 ± 3.9
Perceived Stress Scale	32.4 ± 9.9
Maslach Burnout Inventory-General Survey	46.6 ± 15.4

Some data are missing. Values are shown as number (%) or mean ± standard deviation.
COVID-19 = coronavirus disease 2019.

Table 2. Pearson's correlation coefficients for each variable among cold chain workers (n = 200)

Variables	PHQ-9	SAVE-6	ISI	MBI-GS	PSS
1. PHQ-9	1.000				
2. SAVE-6	0.450[*]	1.000			
3. ISI	0.603[*]	0.462[*]	1.000		
4. MBI-GS	0.481[*]	0.305[*]	0.426[*]	1.000	
5. PSS	0.390[*]	0.268[*]	0.380[*]	0.693[*]	1.000

ISI = Insomnia Severity Index, MBI-GS = Maslach Burnout Inventory - General Survey, PHQ-9 = Patient Health Questionnaire-9, PSS = Perceived Stress Scale, SAVE-6 = Stress and Anxiety to Viral Epidemics-6.
[*]$P < 0.01$.

Table 3. Linear regression analysis exploring variables predicting depressive symptoms among cold chain workers (n = 200)

Dependent variables	Included parameter	β	P value	Adjusted R²	F, P value
PHQ-9	SAVE-6	0.183	0.003	0.440	F = 40.04
	ISI	0.409	< 0.001		$P < 0.001$
	MBI-GS	0.236	0.002		
	PSS	0.022	0.786		

ISI = Insomnia Severity Index, MBI-GS = Maslach Burnout Inventory - General Survey, PHQ-9 = Patient Health Questionnaire-9, PSS = Perceived Stress Scale, SAVE-6 = Stress and Anxiety to Viral Epidemics-6.

(r = 0.268, $P < 0.01$) scores. A linear regression analysis was performed to explore variables contributing to cold chain workers' depressive symptoms. It revealed that their depressive symptom was predicted by the SAVE-6 (β = 0.183, $P = 0.003$), ISI (β = 0.409, $P < 0.001$), and MBI-GS (β = 0.236, $P = 0.002$, adjusted R² = 0.440, F = 40.04, $P < 0.001$, **Table 3**) scores.

According to the above results, we performed mediation analyses to further examine the association between burnout, viral anxiety, insomnia, and depressive symptom among cold chain workers. A mediation analysis showed that cold chain workers' burnout directly influenced their depressive symptoms. Viral anxiety or insomnia severity mediated the influence of burnout on their depressive symptoms (**Fig. 1**, **Table 4**).
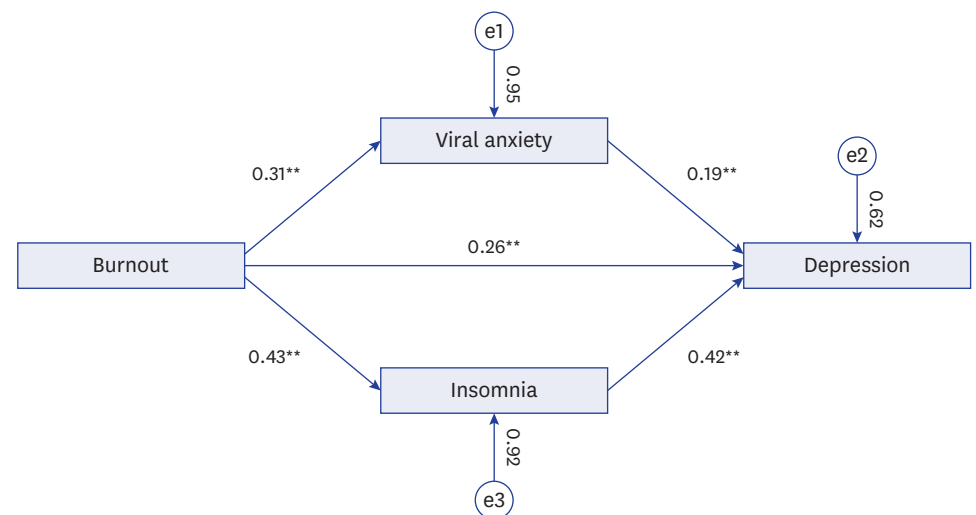

Fig. 1. Mediation models.
[**]$P < 0.01$.

Table 4. Mediation analysis results

Effects	Standardized estimate	SE	Z-value	P	95% CI
Direct effect					
MBI-GS → PHQ-9	0.26	0.02	4.15	< 0.001	0.04–0.12
Indirect effect					
MBI-GS → SAVE-6 → PHQ-9	0.06	0.01	2.68	0.007	0.004–0.03
MBI-GS → ISI → PHQ-9	0.18	0.01	4.86	< 0.001	0.03–0.08
Component					
MBI-GS → SAVE-6	0.31	0.03	4.53	< 0.001	0.08–0.20
SAVE-6 → PHQ-9	0.19	0.04	3.33	< 0.001	0.05–0.21
MBI-GS → ISI	0.43	0.02	6.66	< 0.001	0.08–0.14
ISI → PHQ-9	0.42	0.08	7.10	< 0.001	0.39–0.69
Total effect					
MBI-GS → PHQ-9	0.26	0.02	7.75	< 0.001	0.12–0.20

CI = confidence interval, ISI = Insomnia Severity Index, MBI-GS = Maslach Burnout Inventory - General Survey, PHQ-9 = Patient Health Questionnaire-9, SAVE-6 = Stress and Anxiety to Viral Epidemics-6, SE = standard error.

DISCUSSION

This study examined the association between burnout and depressive symptoms and further examined the mediating effect of insomnia and viral anxiety on this association among cold chain workers during the COVID-19 pandemic. Our results revealed that cold chain workers' depressive symptoms measured by the PHQ-9 scale was predicted by higher levels of viral anxiety, insomnia, and burnout.[23] A mediation analysis indicated that cold chain workers' burnout directly influenced their depression, while viral anxiety or insomnia severity mediated the effect of burnout on depression. Except for the absence of a correlation between perceived stress and depression, all relationships were meaningful.

Empirical studies have shown that, during the SARS and Middle Easter respiratory syndrome outbreaks, viral infections, and the subsequent isolation and quarantine can quickly lead to sleep disorders, anxiety, and depression.[40] Data from disasters suggest emotional distress as a prevalent phenomenon in directly affected and vulnerable populations.[41] Cold chain workers, as a high-risk group, are particularly vulnerable to many job-related hazards, and undergo a considerable amount of work pressures; this is even more important during the pandemic, leading to burnout and negative emotions. Weilenmann et al.[42] explored the level of burnout and psychological distress (depression and anxiety). The results showed a high level of burnout and that 25.9% and 20.7% had clinical levels of anxiety and depression, respectively. Burnout can affect health, leading to the development of physical and psychosomatic symptomatology and depression.[39] This is consistent with the results of our study. The idea of overlap between burnout and depression has been supported by many published papers, which proposed that burnout is a manifestation of depressive syndrome.[43] An individual with more burnout symptoms is prone to a higher anxiety level. This could be explained by the EE that would intrigue the protective mechanism within the body and increase the anxiety level.[44]

It is well known that depression may reduce quality of life,[45] academic achievement,[46] and job performance.[47] Studies focusing on the etiology of depression have shown various determinants. Based on previous work, it is clear that insomnia, anxiety, burnout, and depression are interconnected; there are distinct natural courses of development. However, to the best of our knowledge, such investigations have never been studied among cold chain workers. Therefore, the current study investigated the intrinsic relationship between these variables.

Our findings showed that viral anxiety and insomnia had a mediating effect on the association between burnout and depression. This indicates that the impact of burnout on depression is partly mediated by viral anxiety and insomnia, which means that cold chain workers who are prone to viral anxiety and insomnia are more likely to have severe symptoms of depression when exposed to burnout. This finding is consistent with previous studies.[48,49] Bajaj et al.[50] provided an effective pathway to overcome depression by treating insomnia. Thus, insomnia may serve as a mediator of depression and burnout. We know that, in highly stressful situations, there is a close link between anxiety and depression, and each predicts the other.[51] Although these studies verified the internal association between anxiety and stress, depression, and insomnia during the pandemic, research is limited on the association of viral anxiety with other psychological properties. Most of these studies verified the mediating role of anxiety with the Generalized Anxiety Disorder Scale, Self-Rating Anxiety Scale, Depression and Anxiety Stress Scale,[52] and Hospital Anxiety and Depression Scale, whereas we consider that the specific scale, such as the SAVE-6, which has been validated in the Chinese cold chain population, is more convincing.

The COVID-19 pandemic has led to an increase in anxiety, stress, insomnia, and depression among the population. Cold chain workers severely affected by COVID-19 have been identified as being among the most vulnerable occupational groups considering their frequent exposure to potentially contaminated materials. SARS-CoV-2 persists in conditions found in frozen food, packaging, and cold chain products. Index cases in recent outbreaks in China are linked to the cold chain; the virus has been found on packages and products from other countries that supply China with cold chain products; the live virus was isolated from the outer package of imported frozen products in the epidemiological investigation of the Qingdao outbreak, indicating that it can be carried long distances on cold chain products. Cold chain workers play a critical role in the transportation and storage of temperature-sensitive products, such as foods, vaccines, and medications. Although their work is crucial, these professionals have historically received less attention than others, such as healthcare workers and infected patients.

It is worth stating that cold chain workers in our study were responsible for disinfecting outer packaging; sampling internal and external packaging and food surfaces of goods and performing novel coronavirus nucleic acid testing; collecting and reporting information and data about positive test results; disinfecting and testing the environment and objects; and selling the cold chain food with qualified test results. Our study explored the inner mechanisms of mental health effects of special vulnerable occupational groups under major public health emergencies (i.e., COVID-19 pandemic), which have certain theoretical significance. With the focus on long COVID, we should also focus on long-term psychological problems caused by COVID-19, which can provide information about its prevention, intervention, and follow-up. These findings suggest that interventions or strategies ameliorating viral anxiety and insomnia among cold chain workers may help reduce depression severity directly and indirectly. We focus on the cold chain group and hope that the results can inform psychological interventions for other vulnerable groups with lower education levels who are severely affected by the pandemic.

The present study has some limitations. First, it used a cross-sectional study design. Due to the lack of longitudinal data, no causal inference can be made regarding its results, which limits its etiological evaluation of depression. Second, this survey was done via online relied on subjective measured rather than face-to-face interview. We decided to conduct the online

survey to prevent the viral transmission, though online survey may lead to potential bias. Third, in this sample, there is no participants who were diagnosed with COVID-19. In this pandemic, workers in special situation tried to keep them distance from viral infection not to interfere their work. Similar survey done among healthcare workers[53] also showed low proportion of infected cases. It should be interpreted cautiously. Fourth, small sample size; this study collected data from only one market; thus, our findings cannot be generalized to all cold chain populations during the COVID-19 pandemic in China. Further research with a larger sample of participants, such as a nationwide study, should be performed to obtain a complete picture of all the short- and long-term health consequences of cold chain workers exposed to the COVID-19 virus.

In conclusion, cold chain workers' burnout, insomnia, and viral anxiety are significant factors associated with depression among cold chain workers during the COVID-19 pandemic. This study's findings suggest that burnout directly influences depression, while viral anxiety and insomnia severity mediate the effect of burnout on depression. This implies that interventions aimed at reducing burnout, insomnia, and viral anxiety among cold chain workers may effectively reduce their risk of developing depression. Overall, these findings have important implications for the well-being and mental health of cold chain workers during the pandemic.

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