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Hospital violence and health care workers anxiety：The mediating role of trait coping styles in a cross-sectional survey of county-level hospitals in China

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Abstract

Objective The purpose of this study was to understand the rate of workplace violence in county hospitals in China and its impact on health care workers. And explored the relationship between hospital violence, coping styles, and anxiety, to provide theoretical guidance for effectively reducing the anxiety.

Methods The study used stratified sampling to select 1,200 health care workers from 30 county hospitals in China to conduct a questionnaire survey, of which 1,030 were valid questionnaires, and the effective rate of the questionnaire was 85.83%.

Results The results showed that 67.28% of health care workers in county hospitals in China had experienced workplace violence in the previous 12 months, with verbal violence being the highest (66.12%) followed by physical violence (15.24%). Workplace violence in hospitals was negatively related to positive coping ($r=-0.091$, $p<0.01$), positively related to negative coping ($r=0.114$, $p<0.01$), and anxiety ($r=0.298$, $p<0.01$). Positive coping was negatively associated with anxiety ($r=-0.085$, $p<0.01$), and negative coping was positively associated with anxiety ($r=0.254$, $p<0.01$). Positive and negative coping played a parallel mediating role in the influence of hospital violence on health care workers' anxiety. Compared with positive coping, the mediating effect of negative coping was stronger (95% CI = -0.177, -0.006).

Conclusions The incidence of hospital violence among health care workers in county-level hospitals in China is relatively high, and there is a correlation between hospital violence, coping styles, and anxiety. Positive and negative coping play a mediating role in the impact of hospital violence on the anxiety of health care workers. Therefore, hospital administrators and

health care workers should actively correct the negative behaviors of health care workers after they have been subjected to hospital violence, promoting their transition to positive coping strategies and minimizing the negative impact of anxiety on health care workers.

Keywords： health care workers; hospital violence; trait coping styles; anxiety; physical and mental health

Strengths and limitations of this study

- This study explored the mechanism of the trait coping styles between hospital violence and health care workers anxiety that was not covered in previous studies.
- The results of this study point out the direction of intervention for reducing the anxiety level of health care workers suffering from hospital violence in the future.
- In response to the frequency of hospital violence against health care workers, we have collected the frequency of hospital violence over the past year (12 months), so there may be a reminiscence bias.
- Because it is a cross-sectional research design, it may lead to the study of causality between variables that cannot be determined.

Introduction

At 6 o'clock on December 24, 2019, a physician in the Emergency Department of Beijing Civil Aviation General Hospital was malignantly injured by a patient's family member during normal diagnosis and treatment, leading to a serious neck injury. Although he was rescued, the doctor unfortunately died of the injury.[1] Coincidentally, the director of Ophthalmology of

Chaoyang Hospital in Beijing was seriously injured by a patient, and two doctors in the First Affiliated Hospital of Zhengzhou University were slashed with knives by patients. In China's medical institutions, there are still frequent incidents of violent injuries to doctors by patients or their families. The occurrence of a series of violent injuries to health care workers has once again raised public awareness, and hospital workplace violence has become a focus of attention. The International Labor Organization reports that health services are the industry with the highest risk of workplace violence, which has become a global public health problem.[2 3]

In recent years, despite the joint efforts of the Chinese government and all sectors of society, the incidence of hospital violence in China has decreased compared to previous levels, but remains high, and is still threatening health care workers. Research shows that between 2013 and 2016, as many as 459 cases appeared in Chinese courts due to violent wounding and killing of health care workers.[4] China's county hospitals are responsible for the diagnosis and treatment of most patients in rural areas. As an important part of China's hierarchical diagnosis and treatment system, their status and role are irreplaceable. A clear understanding of the workplace violence experienced by health care workers in county hospitals in China, the impact of this on their mental health, and the role played by coping styles in managing workplace violence and anxiety in hospitals can provide a basis for decision-making by relevant departments and managers to improve the management of violent incidents and to take effective measures to safeguard the physical and mental health of medical workers.

Anxiety

Anxiety is a common condition present in multiple forms and affects emotional, cognitive, physical, behavioral, and relational states. It includes feelings of uneasiness, worry, fear,

apprehension, nervousness, and distress as well as longing, aching, and yearning. Anxiety may also involve difficulty in concentrating, ordering thoughts, speaking, and erratic conduct.[5] Excessive and persistent anxiety is often accompanied by physical symptoms, such as headache, sweating, fatigue, or exhaustion ,[6] which have great negative impacts on individuals' work and life. Anxiety affects an individual's life satisfaction ,[7] individual job satisfaction ,[8] and quality of life .[9] If health care workers are anxious, it may damage their physical and mental health and also reduce the level of diagnosis and treatment and the quality of services, potentially endangering the health and safety of patients. The consequences of this should not be underestimated.

Coping

Coping is defined as a set of cognitive and behavioral strategies that individuals use to manage the internal and external needs of stress situations .[10] Coping styles include positive coping and negative coping. At work, individuals who adopt a proactive approach will not regard risks, demands, and opportunities as potential threats, injuries, or losses. Instead, they see harsh environments as personal challenges that can generate positive emotions and behaviors, thereby improving the outcome of the event.[11] In this sense, they are not passive but active because they take constructive action to create opportunities for growth. Wang Yang et al. found that positive and negative coping have a great impact on the psychological stress level of Chinese health care workers and play a mediating role in the perception of stress and psychological distress.[12] Through an investigation of Chinese nursing staff, Ding Yongqing et al. found that negative coping plays a mediating role between self-efficacy and emotional failure, between optimism and emotional exhaustion, and has a negative effect on the degree

of emotional failure and personality disintegration of Chinese nursing staff [11]. The results of Zhou et al. show that coping styles partly mediate the relationship between job burnout and anxiety symptoms in Chinese doctors.[13]

As an important social and health problem in China today, addressing the question of hospital violence plays a significant role in maintaining the physical and mental health of health care workers, easing the tension between doctors and patients, and building a harmonious and orderly medical and therapeutic order. The frequent occurrence of violence in the workplace at county-level hospitals, which form an important part of China's health service system, has damaged the physical and mental health of health care workers who have undertaken the heavy responsibility of medical and health care. This has produced negative emotions and had a significant negative impact on the quality of daily medical services. Previous studies have shown that different coping styles have different effects on the emotions of individuals. However, for health care workers suffering from workplace violence in hospitals, the effect of different coping styles on the anxiety of health care workers is still unknown. The role of coping styles as a mediator between hospital violence and anxiety has not been previously researched. The purpose of this study was to examine the effect of trait coping styles on the anxiety of health care workers who suffer from hospital violence, to provide a corresponding basis for maintaining and promoting the physical and mental health of medical workers who are victims of violence, thus improving the quality of service and promoting harmonious doctor-patient relationships.

Based on previous theoretical and empirical studies, this study puts forward the following assumptions.

Hypothesis 1: There is a correlation between hospital violence and the anxiety of health care workers.

Hypothesis 2: There is a correlation between trait coping style (positive coping style and negative coping style) and anxiety among health care workers.

Hypothesis 3: Trait coping styles play a partially mediating role between hospital violence and the anxiety of health care workers.

Figure 1. Conceptual model

The hypothetical conceptual model is shown in Figure 1. A large-scale, cross-sectional survey of health care workers in county-level hospitals in China was conducted to understand the mechanism of trait coping styles as a mediator between violence and anxiety among health care workers in the hospital workplace.

Materials and Methods

Data collection

From July 10, 2018 to October 10, 2018, a stratified sampling method was adopted to select 30 county-level hospitals in China, each of which was sampled at a rate of 30% for clinicians and nurses, using the relevant scales for cross-sectional surveys. A total of 1200 health care workers were interviewed. All researchers received uniform training and cleared the assessment before the investigation began. The study was conducted with the permission of the relevant departments, hospital managers, and the interviewees themselves. Informed consent forms were signed before the survey began. A total of 1,200 questionnaires were distributed, of which 1,030 were valid, and the effective rate of the questionnaire was 85.83%

(incomplete questionnaires with obvious errors were deemed to be invalid). The criteria for inclusion in this study were that the participants must (1) be clinical doctors and nursing staff working in the hospital; (2) have more than one year of work experience; (3) and be voluntary health care workers. The exclusion criteria were: (1) Medical personnel who do not want to participate in the investigation; and (2) advanced medical personnel and interns.

Measurements

Demographic characteristics. Self-made questionnaires were used to collect demographic characteristics of health care workers, including gender, age, education, marital status, job title, nature of work, department, years of service, and daily contact with patients.

WPV scale. The study used a scale of workplace violence prepared jointly by the International Labor Organization, the International Council of Nurses, the World Health Organization, and the International Public Service Organization to conduct a survey of hospital violence for health care workers.[14] The scale contains three dimensions: verbal violence, physical violence, and sexual harassment. Verbal violence includes verbal attacks (insults, or the use of other words that undermine human dignity—whether face-to-face encounters or telephone conversations, letters, networks or leaflets—but no physical contact); physical violence includes physical contact or assault with objects (including punching, kicking, slapping, stabbing, pushing, biting, throwing, twisting arms, pulling hair) as well as sexual harassment/violence (sexual assault, rape, or attempted rape). Each item is scored on a 4-point scale, reflecting the frequency of exposure of respondents to hospital violence (0 = 0 times, 1 = 1 time, 2 = 2 or 3 times, 3 = more than 3 times). The lowest score was 0 and the highest was 27. The higher the total score, the

higher the frequency of violence. The scale has good re-confidence and effectiveness and has been widely used in China.[15-17] The Cronbach's coefficient in this study was 0.871.

Trait Coping Style Questionnaire (TCSQ): The Chinese version of the Trait Coping Style Scale was used to measure the coping styles of health care workers in county-level hospitals in China. The scale contains two dimensions: positive coping and negative coping, and each dimension includes a total of 10 items. Each item is scored on a Likert scale, ranging from 1 (absolutely not) to 5 (absolutely). The higher the score for each dimension, the more likely they are to adopt this coping style. The questionnaire has been widely used in previous studies and has good reliability and validity.[18-20] In this study, the Cronbach' s α coefficients of positive coping and negative coping were 0.790 and 0.776, respectively.

Self-rating Anxiety Scale (SAS): This study used the Chinese Self-rating Anxiety Scale (SAS) to measure the anxiety of health care workers. The English version of the scale was compiled by Zung in 1971[21] and localized by Chinese scholars in 1981, making it appropriate for the Chinese groups [22], and has since been widely used[23-25]. This scale contains a total of 20 items, each with four options: none or a little of the time, some of the time, good most of the time, good all of the time. It is divided into 1,2,3,4 points. The standard score for the scale was obtained by multiplying the original score of 20 items by 1.25. A higher score indicates a higher level of anxiety. A total standard score ≥50 points is considered anxious[26 27]. Cronbach's alpha in the current study was 0.865.

Data Analysis

Preliminary analysis. We used EpiData 3.1 for double data entry to ensure data quality. Blank

questionnaires, those with large areas of missing information or incorrect questionnaires, were eliminated. Descriptive statistics were used to analyze the demographic characteristics of the health care workers surveyed. We used independent samples, t-test, or one-way analysis of variance to compare differences in individual anxiety states among different demographic variables. Pearson's correlation analysis was used to examine the correlation between hospital violence, positive coping, and negative coping and anxiety.

Mediation analysis. The intermediary mechanism was calculated using Hayes' SPSS macro PROCESS [28]. The mediation analysis was based on Model 4 and bootstrapping (5000 bootstrap samples) using a 95% confidence interval. The variables with significant correlations in single-factor analysis act as covariate variables, with hospital violence as the independent variable (X), positive coping (M1), and negative coping (M2) as mediating variables, and anxiety as a dependent variable (Y). The macro PROCESS is used to calculate and test the total effect, direct effect, and indirect effect. The effect is considered significant when the 95% confidence interval does not include 0. All research variables were tested for multicollinearity. The above statistical analysis was performed using SPSS V25.0. $P<0.05$ was considered statistically significant.

Ethical Approval

The study was approved by the Ethics Committee of the School of Public Health of Harbin Medical University (Project Identifi Code: HMUIRB20180305). The study was conducted with the consent of all participants and after the signing of informed consent.

Patient and public involvement

Patients and the public were not involved in the design and development of the study. However， academic discussion with previous scholars and the status of anxiety and hospital violence of HCWs have jointly promoted the design and implementation of this study.

Results

Sample Population Description and the Difference Between Participants'Characteristics and Anxiety Scores

In terms of demographic characteristics, the majority of respondents were women (78.25%); they were under 30 years old (75.73%); their education was mainly undergraduate (57.67%); the most primary titles were (44.85%); and the vast majority were nursing staff (60.78%); most of the respondents had more than 8 hours of contact with patients per day (54.85%). (Table 1)

The results of the study showed that gender (t=3.810, P＜0.001), age (F=6.557, P <0.001), marital status (F=6.035, P=0.014), profession (F=6.035,P=0.014), department (F=4.195, P=0.015), Work Experience(years) (F=4.753, P=0.001), and the anxiety score were significantly correlated. (Table 1)

Table 1 Single-factor examination of the demographic characteristics of health care workers (N=1030)

Characteristics	N（%）	Anxiety scores	T/F	P
Gender				
Man	224（21.75）	47.16±13.45	3.810	< 0.001
Woman	806（78.25）	43.52±12.40		
Age				

< 30	465（45.15）	42.12±11.13	6.557	< 0.001
31-40	315（30.58）	46.16±13.16		
41-50	190（18.45）	46.09±14.39		
51-60	57（5.53）	46.23±13.97		
>60	3（0.29）	40.82±13.93		
Education level				
< Bachelor	370（35.92）	43.52±13.10	2.139	0.118
Bachelor	594（57.67）	44.99±12.56		
≥Master	66（6.41）	42.65±11.76		
Marital status				
Married	715（69.42）	44.91±12.88	4.195	0.015
Single	302（29.32）	42.69±11.96		
Other	13（1.26）	49.13±17.41		
Professional title				
Senior	236（22.91）	42.78±11.49	7.314	0.001
Intermediate	332（32.23）	44.90±12.73		
Primary	462（44.85）	46.50±14.53		
Profession				
Physician	404（39.22）	45.08±12.14	6.035	0.014
Nurse	626（60.78）	43.53±12.41		
Department				
Emergency	91（8.83）	46.46±12.79	6.698	0.001
Outpatient	78（7.57）	48.56±16.84		
Ward	861（83.59）	43.70±12.19		
Work Experience(years)				
< 1	85（8.25）	40.66±12.27	4.753	0.001
1-4	264（25.63）	42.89±11.19		

5-10	282（27.38）	44.15±11.89		
11-20	214（20.78）	46.30±13.46		
>20	185（17.96）	45.98±14.68		
Daily working hours				
0-2	43（4.17）	43.52±11.40	1.952	0.100
2-4	48（4.66）	46.77±15.61		
4-6	52（5.05）	41.49±10.40		
6-8	322（31.26）	43.37±12.89		
>8	565（54.85）	44.96±12.60		

Hospital Violence Experienced by Health care workers

As can be seen from Table 2, 67.28% of the respondents in county hospitals in China have suffered from hospital violence in the past 12 months. Of these, 66.12% were the victims of verbal violence, 15.24% suffered physical violence, and the smallest group suffered from sexual harassment (4.56%).

Table 2 Health care workers who are subjected to workplace violence in hospitals (N=1030)

Type of violence	N	M±SD	Percent (%)
Verbal violence	681	2.21±2.10	66.12
Physical violence	157	0.44±1.38	15.24
Sexual harassment	47	0.12±0.72	4.56
Total	693	2.77±3.19	67.28

The Relationship between Hospital Violence and Anxiety in Health care workers

The survey showed that 693 out of 1,030 health care workers had experienced hospital violence, and 233 of them had anxiety symptoms, accounting for 74.92%. This was significantly higher than the proportion of 337 people who did not experience anxiety symptoms in violent healthcare situations (25.08%). (Table 3)

Table 3 Health care workers who suffer from hospital violence and anxiety (N=1030)

Variables	No anxiety		Anxiety		Total
	N	Percent(%)	N	Percent (%)	
No violence	259	36.02	78	25.08	337
Violence	460	63.98	233	74.92	693
Total	719	100.00	311	100.00	1030

Correlations Between Study Variables

Table 4 describes the mean value, standard deviation of each study variable, and Pearson correlation coefficient between the variables. The results of the study showed that the degree of violence was negatively correlated with positive coping (r=-0.091, P=0.003), and positively correlated with negative coping (r=0.114, P <0.001); positive coping was negatively correlated with anxiety (r=- 0.085, P=0.006); negative coping was positively correlated with anxiety (r=0.254, P<0.001), and the degree of violence was positively correlated with anxiety (r=0.298, P<0.001).

Table 4 Means, standard deviations, scale range and Pearson's correlation coefficients (N=1030)

Variables	M	SD	Hospital violence	Positive coping	Negative coping	Anxiety
Hospital violence	2.765	3.189	-			
Positive coping	31.543	7.754	-0.091**	-		
Negative coping	26.626	7.581	0.114**	0.177***	-	
Anxiety	44.313	12.719	0.298***	-0.085**	0.254***	-

Note: ** p＜0.01, *** p＜0.001

Mediation Regression Models of Study Variables

Mediation analysis (incorporating meaningful demographic characteristics in the single-

factor test results: gender, age, marital status, job title, job nature, work department, and working hours into the model) results show that the direct effects of hospital violence on positive and negative coping are -0.232 and 0.308, respectively; the direct effect of positive coping on anxiety was -0.176, and the direct effect of negative coping on anxiety was 0.413; the direct effect of hospital violence on anxiety was 0.910. Positive and negative coping plays a partial mediating role between the degree of hospital violence and anxiety, and the mediating effect of negative coping is stronger than that of positive coping (effect=-0.0217, 95% CI=-0.1771, -0.0063). (Figure 2, Table 5).

Figure 2 Parallel mediation of trait coping styles between hospital violence and anxiety

Note: ** p＜0.01, *** p＜0.001

Table 5 The mediating effect of trait coping styles in the relationship between hospital violence and anxiety (N=1030)

Variables	Effect	SE	95%CI	Percentage mediated (%)
Direct effect	0.9098	0.1216	(0.000,0.671)	84.42
Total indirect effect	0.1680	0.0343	(0.108,0.245)	15.59
Positive coping	0.0407	0.0172	(0.012,0.079)	3.78
Negative coping	0.1272	0.0349	(0.066,0.205)	11.80
Positive coping -Negative coping	-0.0865	0.0431	(-0.177,-0.006)	

Discussion

Chinese County-Level Hospital Health care workers Experience a High Incidence of Violence

With the continuous advancement of China's medical insurance reform and the hierarchical diagnosis and treatment system, the number of both outpatients and inpatients in county-level hospitals in China has increased, contributing significantly to China's health service system. However, the frequent occurrence of workplace violence in county-level hospitals has had a serious negative impact on the physical and mental health of health care workers, and subsequently, on the harmonious and orderly diagnosis and treatment order. This has hindered the effective development of relevant functions at county-level hospitals in China. The study found that 67.28% of health care workers in county hospitals experienced workplace violence, which was higher than the rate of workplace violence in China's tertiary and township hospitals, and of health care workers in other countries [29-32]. An analysis of the reasons for this high figure includes the following: China's medical insurance reform and the rapid promotion of the hierarchical treatment system have led to a significant increase in the number of patients going to county-level hospitals. Although they account for only 20% of the medical resources, they provide medical services for more than 70% of the population in the region[33]. Cai et al. (2019) found that the frequency of hospital violence is significantly positively related to the number of visits to medical institutions[4]. This situation also causes a short communication time between a single patient, and the effectiveness of communication between health care workers and patients cannot be guaranteed[34]. Moreover, the quality of the environment and the level of medical technology at the average county-level hospital in China are significantly lower than those of municipal hospitals, resulting in a relatively high rate of hospital violence. Second, because county-level hospitals have low salary levels and relatively poor welfare benefits, it is difficult to recruit new personnel, resulting in a shortage of human resources in hospitals, which

leads to increased work intensity for individual health care workers, and a possible decline in the quality of medical services. Even if new health care workers are found, their educational level is generally low, and the quality of staff is difficult to guarantee. In terms of patients, patients in county-level hospitals are mainly in rural areas, and the level of patients' education is generally low, possibly resulting in frequent hospital violence. Additionally, in modern Chinese society, the role of morality in social behavior is weakening. Due to the inherent uncertainty of health care, doctor-patient trust is very fragile, and patients are often the target of fraud, extortion, and abuse of power [35]. According to a survey, 66.8% of patients in China have a distrust of health care workers [36], and distrust between doctors and patients increases the risk of hospital violence.

The Chinese government are advised to consider the actual circumstances of county-level hospitals by: continue to implement a policy of graded diagnosis and treatment; increasing support; ensuring the supply of human resources; and providing more opportunities for further study and learning for medical personnel. At the same time, health care workers should strive to improve their learning by updating knowledge and improving their technical levels. Strengthening communication and improving the level of trust between staff and patients could improve the moral quality. Staff should try to avoid the occurrence of hospital violence, to maintain their own safety. The legal and moral aspects should be addressed by increasing the punishment for violent medical acts and strengthening the education of the general public, thereby improving the basic moral quality and standards of the people. These measures would help to reduce the risk of hospital violence, promote harmonious doctor-patient relations, and construct medical and therapeutic orders.

How Hospital Violence Affects the Anxiety of Health care workers

According to the U.S. National Institute of Mental Health, one of the risk factors for anxiety is exposure to stressful and negative living conditions [6 37]. In addition, research showed that the economic, legal, and social pressures that may be caused by offensive violence increase the risk of a series of mental symptoms, including anxiety [38]. As a concrete manifestation of violence, hospital violence may have a certain degree of negative impact on the physical and mental health of individuals. The results of this study show that hospital violence has a significant impact on the anxiety of health care workers, and there is a positive correlation between hospital violence and healthcare worker anxiety. The more frequently they experience hospital violence, the greater the anxiety of health care workers. This also confirms the research results of other scholars [26 39]. Anxiety, as a mental illness, has a negative impact on people's physical and mental health, work, and life. Because of the particularity of the work of medical staff, mental health problems may increase their own job risk, leading to the occurrence of adverse clinical events. Effective avoidance of this situation is important to improve the quality of hospital services and protect patient safety. Hospital managers should pay attention to health care workers who are victims of hospital violence, guide them psychologically in a timely manner, and avoid the development or further deterioration of anxiety. Health care workers should also adjust their mentality in a timely manner, with appropriate support, and take measures to reduce the adverse effects of anxiety on their work and life.

Trait Coping Styles Play a Mediating Role Between Hospital Violence and Anxiety

This study found that the two dimensions of trait coping styles (positive coping and

negative coping) play a role in mediating the relationship between hospital violence and the anxiety of health care workers. Hospital violence has an indirect effect on health care workers' anxiety through positive coping and negative coping. Hospital violence is negatively related to positive coping, and positively related to negative coping. It is evident that the greater the severity of the hospital violence experienced, the less likely health workers are to respond positively and the more likely they are to respond negatively. This is consistent with previous research[40 41]. Various forms of hospital violence have caused serious damage to the mental health of health care workers, which may cause a decrease in work enthusiasm, lower work engagement, and even result in job burnout and turnover intention [42]. This is more likely to result in passive rather than positive ways to deal with the negative impact of hospital violence and increases the damage to their physical and mental health. The results of this study also show that after being subjected to violence in the hospital, adopting positive coping styles is beneficial to reducing anxiety, while adopting negative coping styles has the opposite effect. This is consistent with previous research[13 43]. Health care workers who respond positively are more likely to proactively resolve negative emotions caused by hospital violence and return to normal life and work more quickly. These responses include talking to colleagues, subconsciously correcting their negative emotions and behaviors, and trying to maintain communication with patients or their families. However, health care workers who adopt negative coping styles are more likely to adopt an adverse attitude when dealing with the harmful effects of hospital violence, and they are likely to form a vicious circle of negative emotion feeding on further negative emotion that can aggravate their anxiety.

A particular finding in this study is that in this parallel mediation path, there is a significant

difference in the mediation effect between the two paths of positive coping and negative coping (95CI% CI =-0.139, -0.006). Negative coping is compared to positive coping, which plays a stronger mediating role between hospital violence and anxiety. As a negative incident is experienced, it compounds the negative effects on the physical and mental health of other health care workers. The more violence experienced in hospitals, the more health care workers will lose confidence in their work and life [44 45]. This tends to result in the adoption of a negative approach to dealing with the adverse effects caused by the event, thereby generating or aggravating anxiety. Positive coping, as a strategy that can correct the negative emotions of health care workers, does not play a significant role in actual situations. Therefore, the question of how to help health care workers to adopt a more positive coping strategy after the experience of hospital violence is a problem that the hospital administrators and health care workers themselves should focus on. In previous studies, it was found that targeted training had a significant effect on empowering hospital employees and changing their attitudes toward hospital violence[46]. Hospitals should provide psychological counseling and training opportunities to respond to negative emotions for health care workers who are victims of hospital violence, so that health care workers can learn skills and methods to respond more positively and deal with the adverse effects after they have been subjected to hospital violence. In addition, an organization team of health care workers should also provide psychological and social support to health care workers to help them to process negative emotions and maintain their mental health. At the same time, health care workers should maintain a good attitude, try to correct their negative behaviors, use a more positive way to alleviate or avoid the generation of anxiety, and return to normal work and life as soon as possible. The anxiety of medical staff

can be fundamentally reduced only by adopting more effective prevention and control measures to avoid the occurrence of violence in the hospital workplace. Therefore, the effective prevention and control of violence in hospital workplaces is a key research direction in the future.

Conclusions

Overall,the results of this study show that the incidence of hospital violence among health care workers in county-level hospitals in China is relatively high, and there is a correlation between hospital violence, coping styles, and anxiety. Positive and negative coping play a mediating role in the impact of hospital violence on the anxiety of health care workers. Moreover, compared with positive coping, negative coping has a stronger mediating role. Therefore, the government should pay special attention to prevention measures, improvement of the training and support of health care workers, and education of the public, so as to reduce the incidence of hospital violence. Hospital administrators should also focus on this issue and provide corresponding support and assistance to health care workers. Health care workers should maintain a good attitude, try to correct their own negative behaviors, and develop positive coping skills to relieve or avoid their own anxiety.

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and conceptualization of the study, acquisition of data, and data interpretation. LF ,NXand YW participated in the design and conceptualization of study, acquisition of data, revising of the manuscript, acquisition of funding, and supervision. All authors were involved in the manuscript's revision and approved this final version.

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Competing interests None declared.

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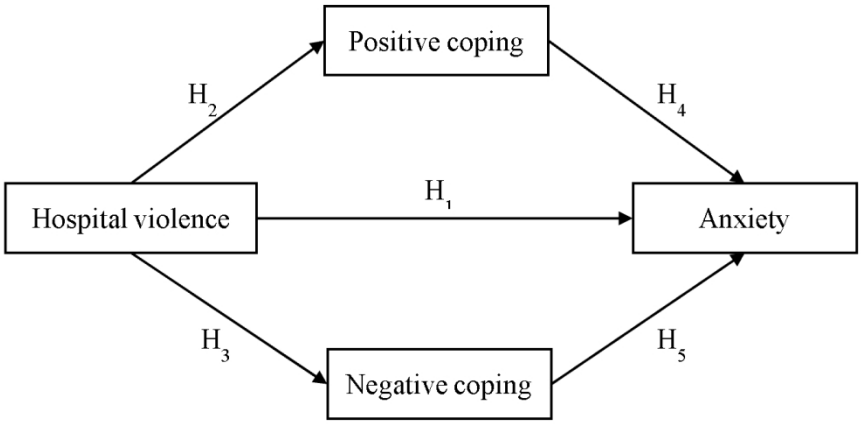

Figure 1 Conceptual model

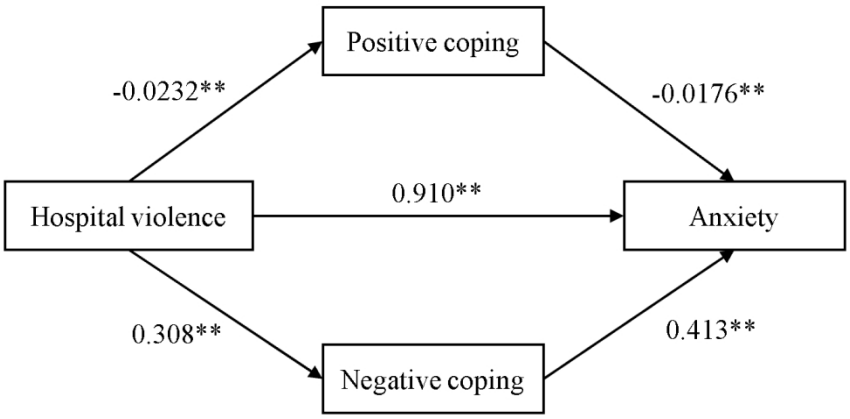

Figure 2. Parallel mediation of trait coping styles between hospital violence and anxiety
Note: ** p＜0.01, *** p＜0.001

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The mediating role of coping styles on anxiety in health care workers victim of violence: a cross-sectional survey in China hospitals

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Abstract

Objective The purposes of this study were to evaluate the rate of workplace violence in county hospitals in China and its impact on health care workers, and to explore the relationship between hospital violence, coping styles, and anxiety to provide effective procedures for reducing anxiety among health care workers.

Methods The study used stratified sampling to select 1,200 health care workers from 30 county hospitals in China to conduct a questionnaire survey. Of these, 1,030 were valid questionnaires, and the effective response rate was 85.83%. We collected demographic characteristics of our participants and administered the following scales to them: Workplace Violence, Trait Coping Style, Self-rating Anxiety. Data were statistically analyzed.

Results The results showed that 67.28% of health care workers in county hospitals in China had experienced workplace violence in the previous 12 months, with prevalent verbal violence (66.12%) followed by physical violence (15.24%). Workplace violence in hospitals was negatively related to positive coping ($r=-0.091$, $p<0.01$) but positively related to negative coping ($r=0.114$, $p<0.01$) and anxiety ($r=0.298$, $p<0.01$). Positive and negative coping was negatively($r=-0.085$, $p<0.01$) and positively($r=0.254$, $p<0.01$) associated with anxiety respectively. Positive and negative coping influenced both hsopital workplace violence and anxiety in health care workers who were victims of violence. Compared with positive coping, the mediating effect of negative coping was stronger (95% CI = -0.177, -0.006).

Conclusions The incidence of workplace violence among health care workers in county-level hospitals in China is relatively high, and there is a correlation between hospital violence, coping styles, and anxiety. Positive and negative coping play a mediating role in the impact of

hospital violence on health care workers' anxiety. Therefore, hospital administrators should actively promote health care workers' transition to positive coping strategies and minimize the negative impact of anxiety on them.

Keywords: health care workers; hospital violence; trait coping styles; anxiety; physical and mental health

Strengths and limitations of this study

- This study explored the mechanism of healthcare workers' coping style on both hospital violence and anxiety they suffered.
- This study points out the direction of intervention for reducing the anxiety in health care workers suffering from hospital violence.
- This study cannot allow us to infer causality between variables due to its cross-sectional research design.
- The assessment is based entirely on self-reports, which may cause recall bias.
- The sample size is relatively small, and it is necessary to continue to expand the sample and conduct longitudinal surveys.

Introduction

At 6 o'clock on December 24, 2019, a physician in the Emergency Department of Beijing Civil Aviation General Hospital was malignantly injured by a patient's family member during normal diagnosis and treatment, leading to a serious neck injury. Although she was rescued, she later died from the injury.[1] Coincidentally, the director of Ophthalmology of Chaoyang Hospital in

Beijing was seriously injured by a patient, and two doctors in the First Affiliated Hospital of Zhengzhou University were slashed with knives by patients. In China's medical institutions, there are still frequent incidents of violent injuries to doctors by patients or their families. The occurrence of a series of violent injuries to health care workers has once again raised public awareness, and hospital workplace violence has become a focus of attention. The International Labor Organization reports that health services are the industry with the highest risk of workplace violence, which has become a global public health problem.[2 3]

With the continuous occurrence of hospital violence, the Chinese government has realized the magnitude of the problem, and has taken a series of measures to effectively prevent and control its occurrence. The implementation of these measures has made the incidence of hospital violence in China lower than before; however, it is still higher than that of other countries and, which still has a serious negative impact on the work and life of health care workers. Research shows that between 2013 and 2016, as many as 459 cases appeared in Chinese courts due to violent wounding and killing of health care workers.[4] China's county hospitals are responsible for the diagnosis and treatment of most patients in rural areas. As an important part of China's hierarchical diagnosis and treatment system, their status and role are irreplaceable. A clear understanding of the workplace violence experienced by health care workers in county hospitals in China, the impact of this on their mental health, and the role played by coping styles in managing workplace violence and anxiety in hospitals can provide a basis for decision-making by relevant departments and managers to improve the management of violent incidents and to take effective measures to safeguard the physical and mental health of medical workers.

Anxiety

If health care workers feel anxious, it may damage their physical and mental health as well as reduce the quality of the services provided, potentially endangering the health and safety of patients. The consequences of this should not be underestimated. Excessive and persistent anxiety is often accompanied by physical symptoms, such as headache, sweating, fatigue, or exhaustion[5]; all these symptoms can negatively impact individuals' work and life. Previous research has shown that anxiety affects an individual's life satisfaction,[6] job satisfaction[7], and quality of life.[8]

Coping styles

Coping is defined as a set of cognitive and behavioral strategies that individuals use to manage the internal and external needs of stress situations.[9] Coping styles can either be positive or negative. The former refers to a positive response that focuses on constructive actions aimed at changing the stressful situation, and is typically associated with problem-solving behaviors and effective mood regulation; the latter is a passive style that focuses on negative assessment and emotional expression, avoiding stressful situations and social isolation.[10]At work, individuals who adopt a proactive approach will not regard risks, demands, and opportunities as potential threats, injuries, or losses. Instead, they see harsh environments as personal challenges that can generate positive emotions and behaviors, thereby improving the outcome of the event[11]. In this sense, they are not passive but active because they take constructive action to create opportunities for growth. Wang Yang et al. found that positive and negative coping have a great impact on the psychological stress level of Chinese health care workers and play

a mediating role in the perception of stress and psychological distress.[12] Through an investigation of Chinese nursing staff, Ding Yongqing et al. found that negative coping plays a mediating role between self-efficacy and emotional failure, between optimism and emotional exhaustion, and has a negative effect on the degree of emotional failure and personality disintegration of Chinese nursing staff.[10] The results of Zhou et al. show that coping styles partly mediate the relationship between job burnout and anxiety symptoms in Chinese doctors.[13]

As an important social and health problem in China today, addressing the question of hospital violence plays a significant role in maintaining the physical and mental health of health care workers, easing the tension between doctors and patients, and building a harmonious and orderly medical and therapeutic order. The frequent occurrence of violence in the workplace at county-level hospitals, which form an important part of China's health service system, has damaged the physical and mental health of health care workers who have undertaken the heavy responsibility of medical and health care. This has produced negative emotions and had a significant negative impact on the quality of daily medical services. Previous studies have shown that different coping styles have different effects on the emotions of individuals. However, for health care workers suffering from workplace violence in hospitals, the effect of different coping styles on the anxiety of health care workers is still unknown. The role of coping styles as a mediator between hospital violence and anxiety has not been previously researched. The purposes of this study were to evaluate the rate of workplace violence in county hospitals in China and its impact on health care workers and to explore the relationship between hospital violence, coping styles, and anxiety to provide effective procedures for reducing anxiety among

health care workers.

Based on previous theoretical and empirical studies, this study puts the following assumptions forward:

Hypothesis 1: There is a correlation between hospital violence and the anxiety of health care workers.

Hypothesis 2: There is a correlation between trait coping style (positive coping style and negative coping style) and anxiety among health care workers.

Hypothesis 3: Trait coping styles play a partially mediating role between hospital violence and the anxiety of health care workers.

Materials and Methods

Data collection

From July 10, 2018 to October 10, 2018, a stratified sampling method was adopted to select 30 county-level hospitals in China, each of which was sampled at a rate of 30% for clinicians and nurses, using the relevant scales for cross-sectional surveys. A total of 1200 health care workers were interviewed. All researchers received uniform training and cleared the assessment before the investigation began. The study was conducted with the permission of the relevant departments, hospital managers, and the interviewees themselves. Informed consent forms were signed before the survey began. A total of 1,200 questionnaires were distributed, of which 1,030 were valid, and the effective response rate of the questionnaire was 85.83% (incomplete questionnaires with obvious errors were deemed to be invalid). The inclusion criteria for participants were the following: (1) clinical doctors and nurses working in the hospital, (2) with

almost one year of work experience, and (3) who accepted voluntary participation in the study. The exclusion criteria were: (1) Medical personnel who do not want to participate in the investigation; and (2) advanced medical personnel and interns.

Measurements

Demographic characteristics. Self-made questionnaires were used to collect demographic characteristics of health care workers, including gender, age, education, marital status, job title, nature of work, department, years of service, and daily contact with patients.

Workplace Violence Scale. The study used the Workplace Violence Scale, which was jointly prepared by the International Labor Organization, the International Council of Nurses, the World Health Organization, and the International Public Service Organization to assess health care workers' experiences with workplace violence.[14] The scale contains three dimensions: verbal violence, physical violence, and sexual harassment. Verbal violence includes verbal attacks (insults, or the use of other words that undermine human dignity—whether face-to-face encounters or telephone conversations, letters, networks or leaflets—but no physical contact); physical violence includes physical contact or assault with objects (including punching, kicking, slapping, stabbing, pushing, biting, throwing, twisting arms, or pulling hair) as well as sexual harassment/violence (sexual assault, rape, or attempted rape). Each item is scored on a 4-point scale, reflecting the frequency of exposure of respondents to hospital violence (0 = 0 times, 1 = 1 time, 2 = 2 or 3 times, 3 = more than 3 times). The lowest score was 0 and the highest was 27. The higher the total score, the higher the frequency of violence. The scale has good re-confidence and effectiveness and has been widely used in China.[15-17] The Cronbach's alpha in

this study was 0.871.

Trait Coping Style Questionnaire: The Chinese version of the Trait Coping Style Scale was used to measure the coping styles of health care workers in county-level hospitals in China. The scale contains two dimensions: positive coping and negative coping, and each dimension includes a total of 10 items. Each item is scored on a 5-point Likert scale, ranging from 1 (absolutely not) to 5 (absolutely). The higher the score for each dimension, the more likely respondents are to adopt this coping style. The questionnaire has been widely used in previous studies and has good reliability and validity.[18-20] In this study, the Cronbach's alpha coefficients of positive coping and negative coping were 0.790 and 0.776, respectively.

Self-rating Anxiety Scale (SAS): This study used the Chinese Self-rating Anxiety Scale (SAS) to measure health care workers' anxiety. The English version of the scale was compiled by Zung in 1971[21] and localized by Chinese scholars in 1981, making it appropriate to use in the Chinese population[22]; it has since been widely used.[23-25] This scale contains a total of 20 items measured on a 4-point Likert scale, ranging from 1 (none or a little of the time) to 4 (good all of the time). The standard score for the scale was obtained by multiplying the original score of 20 items by 1.25. A higher score indicates a higher level of anxiety. A total standard score ≥50 points is considered anxious.[26 27] Cronbach's alpha in the current study was 0.865.

Data Analysis

Preliminary analysis. We used EpiData 3.1 for double data entry to ensure data quality. Blank questionnaires, those with large areas of missing information, or incorrect questionnaires, were eliminated. The normal distributions of the continuous variables were verified using Shapiro-

Wilk test. Descriptive statistics were used to analyze the demographic characteristics of the health care workers surveyed. We used independent sample t-test or single-factor variance and multivariate linear regression analysis to compare the differences of individual anxiety state of different demographic variables. Pearson correlation analysis was used to explore the relationship among hospital violence, positive coping, negative coping and anxiety.

Mediation analysis. The intermediary mechanism was calculated using Hayes' SPSS macro PROCESS. [28] The mediation analysis was based on Model 4 and bootstrapping (5000 bootstrap samples) using a 95% confidence interval. The variables with significant correlations in single-factor analysis act as covariate variables, with hospital violence as the independent variable (X), positive coping (M1), and negative coping (M2) as mediating variables, and anxiety as a dependent variable (Y). The macro PROCESS is used to calculate and test the total, direct, and indirect effect. The effect is considered significant when the 95% confidence interval does not include 0. All research variables were tested for multicollinearity. The above statistical analysis was performed using SPSS V25.0. $P<0.05$ was considered statistically significant.

Ethical Approval

The study was approved by the Ethics Committee of the School of Public Health of Harbin Medical University (Project Identification Code: HMUIRB20180305). The study was conducted with the consent of all participants and after the signing of informed consent.

Patient and public involvement

Patients and the public were not involved in the design and development of the study. However, academic discussions with previous scholars and the status of anxiety and hospital violence of

health care workers have jointly contributed to the design and implementation of this study.

Results

Sample population description and the difference between participants' characteristics and anxiety scores

In terms of demographic characteristics, the majority of respondents were female (78.25%); under 30 years old (75.73%); mainly undergraduate (57.67%); the most professional title was primary (44.85%); and the vast majority were nursing staff (60.78%); most of the respondents had more than 8 hours of contact with patients per day (54.85%). (Table 1)

The results of the study showed that gender (t=3.810, P＜0.001), age (F=6.557, P <0.001), marital status (F=6.035, P=0.014), profession (F=6.035,P=0.014), department (F=4.195, P=0.015), work experience (years) (F=4.753, P=0.001), and the anxiety score were significantly correlated. (Table 1)

Table 1 The SAS score in our participants divided by demographic characteristics (N=1030)

Characteristics	N（%）	SAS score	T/F	P
Gender				
Male	224（21.75）	47.16±13.45	3.810	< 0.001
Female	806（78.25）	43.52±12.40		
Age				
< 30	465（45.15）	42.12±11.13	6.557	< 0.001
31-40	315（30.58）	46.16±13.16		
41-50	190（18.45）	46.09±14.39		
51-60	57（5.53）	46.23±13.97		
>60	3（0.29）	40.82±13.93		

Education level				
< Bachelor	370（35.92）	43.52±13.10	2.139	0.118
Bachelor	594（57.67）	44.99±12.56		
≥Master	66（6.41）	42.65±11.76		
Marital status				
Married	715（69.42）	44.91±12.88	4.195	0.015
Single	302（29.32）	42.69±11.96		
Other	13（1.26）	49.13±17.41		
Professional title				
Senior	236（22.91）	42.78±11.49	7.314	0.001
Intermediate	332（32.23）	44.90±12.73		
Primary	462（44.85）	46.50±14.53		
Profession				
Physician	404（39.22）	45.08±12.14	6.035	0.014
Nurse	626（60.78）	43.53±12.41		
Department				
Emergency	91（8.83）	46.46±12.79	6.698	0.001
Outpatient	78（7.57）	48.56±16.84		
Ward	861（83.59）	43.70±12.19		
Work Experience (years)				
< 1	85（8.25）	40.66±12.27	4.753	0.001
1-4	264（25.63）	42.89±11.19		
5-10	282（27.38）	44.15±11.89		
11-20	214（20.78）	46.30±13.46		
>20	185（17.96）	45.98±14.68		
Daily working hours				
< 2	43（4.17）	43.52±11.40	1.952	0.100

2-4	48（4.66）	46.77±15.61
5-6	52（5.05）	41.49±10.40
7-8	322（31.26）	43.37±12.89
>8	565（54.85）	44.96±12.60

Analysis of the factors that influence health care workers' anxiety

The results of the study show that female health care workers are less anxious than male health care workers (B=-2.72, P＜0.001), and health care workers aged 31-40 are more anxious than younger health care workers (B=2.83, P=0.004). (Table 2)

Table 2 Analysis of the factors that influence health care workers' anxiety

Characteristics	B	Std. Error	t	95%CI	P
Constant	37.64	2.58	14.57	32.57,42.70	＜0.001
Gender					
Male	1.00				
Female	-2.72	0.94	-2.88	-4.57,-0.87	0.004
Age					
< 30	1.00				
31-40	2.83	1.06	2.66	0.75,4.92	0.008
41-50	2.07	1.49	1.39	-0.85,4.99	0.165
51-60	1.64	2.06	0.80	-2.40,5.68	0.427
>60					
Marital status					
Married	1.00				
Single	0.75	0.92	0.81	-1.06,2.55	0.42
Other	3.74	2.81	1.33	-1.77,9.25	0.18
Professional title					
Senior	1.00				

Intermediate	-0.84	0.95	-0.89	-2.69,1.02	0.38
Primary	-0.93	1.18	-0.79	-3.24,1.39	0.43
Profession					
Physician	1.00				
Nurse	0.90	0.84	1.08	-0.74,2.55	0.28
Department					
Emergency	1.00				
Outpatient	1.97	1.57	1.25	-1.11,5.06	0.21
Ward	-1.92	-1.11	-1.72	-4.10,0.27	0.09
Work Experience(years)					
< 1	1.00				
1-4	1.88	1.27	1.48	-0.62,4.38	0.14
5-10	1.68	1.42	1.18	-1.12,4.47	0.24
11-20	2.06	1.69	1.22	-1.27,5.38	0.23
>20	2.11	1.89	1.12	-1.61,5.83	0.27

Hospital violence experienced by health care workers

As can be seen from Table 3, 67.28% of the respondents in county hospitals in China have suffered from hospital violence in the past 12 months. Of these, 66.12% were the victims of verbal violence, 15.24% suffered physical violence, and the smallest group suffered from sexual harassment (4.56%).

Table 3 Type of violence experienced by health care workers (N=1030)

Type of violence	N	Percent (%)
Verbal violence	681	66.12
Physical violence	157	15.24

Sexual harassment	47	4.56
Total	693	67.28

The relationship between hospital violence and anxiety in health care workers

The survey showed that 693 out of 1,030 health care workers had experienced hospital violence, and 233 of them had anxiety symptoms, accounting for 74.92%. This was significantly higher than the proportion of 337 people who did not experience anxiety symptoms in violent healthcare situations (25.08%). (Table 4)

Table 4 Health care workers who suffer from hospital violence and anxiety (N=1030)

Variables	No anxiety		Anxiety		Total
	N	Percent(%)	N	Percent (%)	
No violence	259	36.02	78	25.08	337
Violence	460	63.98	233	74.92	693
Total	719	100.00	311	100.00	1030

Correlations between study variables

Table 5 describes the mean value, standard deviation of each study variable, and Pearson correlation coefficient between the variables. The results of the study showed that the degree of violence was negatively correlated with positive coping (r=-0.091, P=0.003), and positively correlated with negative coping (r=0.114, P <0.001); positive coping was negatively correlated with anxiety (r=- 0.085, P=0.006); negative coping was positively correlated with anxiety (r=0.254, P<0.001), and the degree of violence was positively correlated with anxiety (r=0.298, P<0.001).

Table 5 Means, standard deviations, scale range, and Pearson's correlation coefficients (N=1030)

Variables	M	SD	Hospital violence	Positive coping	Negative coping	Anxiety
Hospital violence	2.765	3.189	-			
Positive coping	31.543	7.754	-0.091**	-		
Negative coping	26.626	7.581	0.114**	0.177***	-	
Anxiety	44.313	12.719	0.298***	-0.085**	0.254***	-

Note: ** p＜0.01, *** p＜0.001

Mediation regression models of study variables

Mediation analysis (incorporating meaningful demographic characteristics in the single-factor test results: gender, age, marital status, job title, job nature, work department, and working hours into the model) results show that the direct effects of hospital violence on positive and negative coping are -0.232 and 0.308, respectively; the direct effect of positive coping on anxiety was -0.176, and the direct effect of negative coping on anxiety was 0.413; the direct effect of hospital violence on anxiety was 0.910. Positive and negative coping plays a partial mediating role between the degree of hospital violence and anxiety, and the mediating effect of negative coping is stronger than that of positive coping (effect=-0.0217, 95% CI=-0.1771, -0.0063). (Figure 1, Table 6).

Figure 1 Parallel mediation of trait coping styles between hospital violence and anxiety

Note: ** p＜0.01, *** p＜0.001

Table 6 The mediating effect of trait coping styles in the relationship between hospital violence and anxiety (N=1030)

Variables	Effect	SE	95%CI	Percentage mediated (%)
Direct effect	0.9098	0.1216	(0.000,0.671)	84.42
Total indirect effect	0.1680	0.0343	(0.108,0.245)	15.59
Positive coping	0.0407	0.0172	(0.012,0.079)	3.78
Negative coping	0.1272	0.0349	(0.066,0.205)	11.80
P-N	-0.0865	0.0431	(-0.177,-0.006)	

Note: P-N means Positive coping-Negative coping, when the 95% CI does not contain 0, the mediation effect between the two mediation paths is different.

Discussion

Gender and age are the factors that influence health care workers' anxiety the most

The results of our study suggest that among health care workers in Chinese county-level hospitals, men are more prone to anxiety than women. This is inconsistent with the findings of previous studies, which found that women are more vulnerable and prone to anxiety in the face of work pressure.[29 30] However, male health care workers, as the main staff of the work, tend to undertake more heavy tasks. When they have bad emotions, they often can't get the attention of the people around them in time, and the negative emotions are difficult to solve effectively, which leading to an increase in anxiety.[31]The results also show that health care workers aged 31-40 are more likely to have anxiety than those under 30. This finding might be explained by the fact that health care workers between the ages of 31-40 are in an ascending period of professional development, and bear family responsibilities at the same time.[32 33] The dual

pressures of occupation and family might cause great distress to them, and long-term accumulation of stress can lead to the development of anxiety.

Chinese county-level hospital health care workers experience a high incidence of violence

With the continuous advancement of China's medical insurance reform and the hierarchical diagnosis and treatment system, the number of both outpatients and inpatients in county-level hospitals in China has increased, contributing significantly to China's health service system. However, the frequent occurrence of workplace violence in county-level hospitals has had a serious negative impact on the physical and mental health of health care workers, as well as on appropriate diagnosis, treatment, and care of patients. This has hindered the effective development of relevant functions at county-level hospitals in China. The study found that 67.28% of health care workers in county hospitals experienced workplace violence, which was higher than the rate of workplace violence in China's tertiary and township hospitals, and of health care workers in other countries. [34-39]

An analysis of the reasons for this high figure includes the following: China's medical insurance reform and the rapid promotion of the hierarchical treatment system have led to a significant increase in the number of patients going to county-level hospitals. Although they account for only 20% of the medical resources, they provide medical services for more than 70% of the population in the region.[40] Cai et al. (2019) found that the frequency of hospital violence is significantly positively related to the number of visits to medical institutions.[4] This situation also causes a short communication time between a single patient, and the effectiveness of communication between health care workers and patients cannot be guaranteed[41]. In addition, the quality of the environment and the level of medical technology at the average county-level

hospital in China are significantly lower than those of municipal hospitals, resulting in a relatively high rate of hospital violence. Furthermore, because county-level hospitals have low salary levels and relatively poor welfare benefits, it is difficult to recruit new personnel, resulting in a shortage of human resources, which leads to increased work intensity for individual health care workers, and a possible decline in the quality of medical services. Even if new health care workers are found, their educational level is generally low, and the quality of staff is difficult to guarantee. Regarding the patients, those who visit county-level hospitals are mainly from rural areas, and their education level is generally low, possibly resulting in frequent hospital violence. Additionally, due to the inherent uncertainty of health care, doctor-patient trust is very fragile, and patients are often the target of fraud, extortion, and abuse of power. [42] According to a survey, 66.8% of patients in China distrust health care workers, [43] and distrust between doctors and patients increases the risk of hospital violence.

Due to the differences in cultural background or special place intervention measures in different countries, the incidence of hospital violence in China is different from that in other countries.[44] [45] China has a large population. The number of health care workers per 1000 population and the government's medical expenditure is low, which leads to the heavy workload of doctors and nurses, damages the quality of communication with patients, and leads to the occurrence of hospital violence. [46] [47] In addition, some studies have shown that in Chinese medical institutions, the waiting time of patients is usually longer than that in other European countries, resulting in shorter communication time between health care workers and patients, which is more likely to lead to hospital violence. Moreover, when conflicts arise between doctors and patients, for some patients and their families, resorting to violence—especially

toward health care workers—seems to be the only way to express dissatisfaction with the medical system.[48]

The Chinese government are advised to consider the actual circumstances of county-level hospitals by continuing to implement a policy of graded diagnosis and treatment; increasing support; ensuring the supply of human resources, and providing more opportunities for further study and learning for medical personnel. At the same time, health care workers should strive to improve their learning by updating knowledge and improving their technical levels. Strengthening communication and improving the level of trust between staff and patients could improve the moral quality. Staff should try to avoid the occurrence of hospital violence, to maintain their own safety. The legal and moral aspects should be addressed by increasing the punishment for violent medical acts and strengthening the education of the general public, thereby improving the basic moral quality and standards of the people. These measures would help to reduce the risk of hospital violence, promote harmonious doctor-patient relations, and establish a safe and orderly diagnosis and treatment order.

How hospital violence affects health care workers' anxiety

According to the U.S. National Institute of Mental Health, one of the risk factors for anxiety is exposure to stressful and negative living conditions. [5 49] In addition, research showed that the economic, legal, and social pressures that may be caused by offensive violence increase the risk of a series of mental symptoms, including anxiety.[50] As a concrete manifestation of violence, hospital violence may have a certain degree of negative impact on the physical and mental health of individuals. The results of this study show that hospital violence has a significant impact on the anxiety of health care workers, and there is a positive correlation

between hospital violence and healthcare worker anxiety. The more frequently they experience hospital violence, the greater the anxiety of health care workers. This also confirms the research results of other scholars. [26 51] Anxiety, as a mental illness, has a negative impact on people's physical and mental health, work, and life. Because of the particularity of the work of medical staff, mental health problems may increase their own job risk, leading to the occurrence of adverse clinical events. Effective avoidance of this situation is important to improve the quality of hospital services and protect patient safety. Hospital managers should pay attention to health care workers who are victims of hospital violence, guide them psychologically in a timely manner, and avoid the development or further deterioration of anxiety. Health care workers should also adjust their mentality in a timely manner, with appropriate support, and take measures to reduce the adverse effects of anxiety on their work and life.

Trait coping styles play a mediating role between hospital violence and anxiety

This study found that the two dimensions of trait coping styles (positive coping and negative coping) play a role in mediating the relationship between hospital violence and the anxiety of health care workers. Hospital violence has an indirect effect on health care workers' anxiety through positive coping and negative coping. Hospital violence is negatively related to positive coping, and positively related to negative coping. It is evident that the greater the severity of the hospital violence experienced, the less likely health workers are to respond positively and the more likely they are to respond negatively. This is consistent with previous research.[52 53] Various forms of hospital violence have caused serious damage to the mental health of health care workers, which may cause a decrease in work enthusiasm, lower work engagement, and even result in job burnout and turnover intention.[54] This is more likely to result in passive rather

than positive ways to deal with the negative impact of hospital violence and increases the damage to their physical and mental health. The results of this study also show that after being subjected to violence in the hospital, adopting positive coping styles is beneficial to reducing anxiety, while adopting negative coping styles has the opposite effect. This is consistent with previous research.[13 55] Health care workers who respond positively are more likely to proactively resolve negative emotions caused by hospital violence and return to normal life and work more quickly. These responses include talking to colleagues, subconsciously correcting their negative emotions and behaviors, and trying to maintain communication with patients or their families. However, health care workers who adopt negative coping styles are more likely to adopt an adverse attitude when dealing with the harmful effects of hospital violence, and they are likely to form a vicious circle of negative emotion feeding on further negative emotion that can aggravate their anxiety.

A particular finding in this study is that in this parallel mediation path, there is a significant difference between the mediation effects of positive and negative coping (95% CI=-0.177, -0.006). Negative coping plays a stronger mediating role between hospital violence and anxiety. As a negative incident is experienced by the health care worker, it also affects the physical and mental health of other health care workers. The more violence experienced in hospitals, the more health care workers will lose confidence in their work and life. [56 57] This tends to result in the adoption of a negative approach to dealing with the adverse effects caused by the event, thereby generating or aggravating anxiety. Positive coping, as a strategy that can correct the negative emotions of health care workers, does not play a significant role in the actual situation. Therefore, the question of how to help health care workers to adopt a more positive coping

strategy after the experience of hospital violence is one that hospital administrators and health care workers themselves should focus on. In previous studies, it was found that targeted training had a significant effect on empowering hospital employees and changing their attitudes toward hospital violence.[58] Hospitals should provide psychological counseling and training opportunities to respond to negative emotions for health care workers who are victims of hospital violence, so that they can learn skills and methods to respond more positively and deal with the adverse effects after they have been subjected to hospital violence. In addition, an organization team of health care workers should also provide psychological and social support to health care workers to help them processing negative emotions and protect their mental health. At the same time, health care workers should maintain a good attitude, try to correct their negative behaviors, use a more positive way to alleviate or avoid the generation of anxiety and return to their normal work routine and life as soon as possible. The anxiety of medical staff can be fundamentally reduced only by adopting more effective prevention and control measures to avoid the occurrence of violence in the hospital workplace. Therefore, the effective prevention and control of violence in hospital workplaces is a key research direction in the future.

Limitations

This study investigated the incidence of violence and anxiety of health care workers in 30 county-level hospitals in China and discussed the relationship between hospital violence, trait coping style, and anxiety. The aim was to provide a reference for the government to understand the current situation that health care workers face, and suggest an intervention pathway to reduce their anxiety. However, this study has several limitations. First, the sample size is

relatively small; therefore, the scope of the survey needs to be expanded to more accurately understand the real state of hospital violence and anxiety of Chinese health care workers. Second, this study is a cross-sectional study, and it is difficult to determine the causal relationship between the variables. Third, the assessment is based on the self-report of health care workers, and there may be recall bias.

Conclusions

Overall, the results of this study show that the incidence of hospital violence among health care workers in county-level hospitals in China is relatively high, and there is a correlation between hospital violence, coping styles, and anxiety. Positive and negative coping play a mediating role in the impact of hospital violence on the anxiety of health care workers. Moreover, compared with positive coping, negative coping has a stronger mediating role. Therefore, the government should pay special attention to prevention measures, improvement of the training and support of health care workers, and education of the public, to reduce the incidence of hospital violence. Hospital administrators should also focus on this issue and provide corresponding support and assistance to health care workers. Health care workers should maintain a good attitude, try to correct their negative behaviors, and develop positive coping skills to relieve or avoid their anxiety.

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and manuscript drafting. LS and LW participated in data acquisition. ZL participated in data analysis. GL participated in discussion and manuscript revision. YZ participated in the design and conceptualization of the study, acquisition of data, and data interpretation. LF ,NXand YW participated in the design and conceptualization of study, acquisition of data, revising of the manuscript, acquisition of funding, and supervision. All authors were involved in the manuscript's revision and approved this final version.

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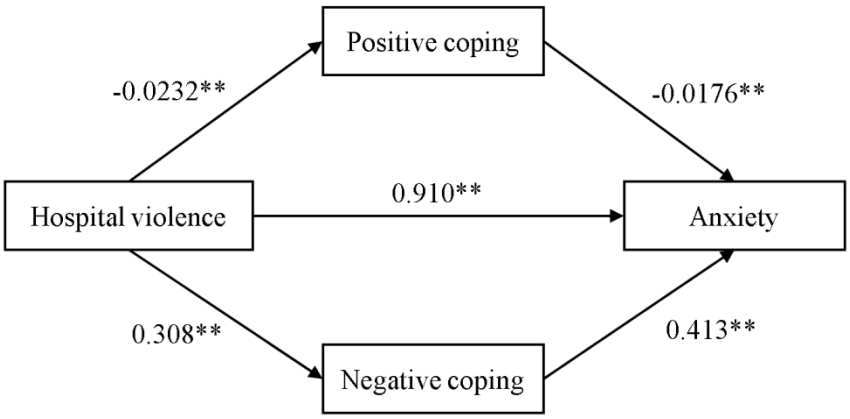

Figure 1 Parallel mediation of trait coping styles between hospital violence and anxiety

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STROBE 2007 (v4) checklist of items to be included in reports of observational studies in epidemiology*

Checklist for cohort, case-control, and cross-sectional studies (combined)

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2-3
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-7
Objectives	3	State specific objectives, including any pre-specified hypotheses	6-7
Methods			
Study design	4	Present key elements of study design early in the paper	8-9
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	7
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants	8-9
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case	
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	8-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*8-9*
Bias	9	Describe any efforts to address potential sources of bias	23
Study size	10	Explain how the study size was arrived at	
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	9-10
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	9-10
		(*b*) Describe any methods used to examine subgroups and interactions	
		(*c*) Explain how missing data were addressed	
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed	7

		Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	7
		(b) Give reasons for non-participation at each stage	8
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11
		(b) Indicate number of participants with missing data for each variable of interest	
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)	
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time	
		Case-control study—Report numbers in each exposure category, or summary measures of exposure	
		Cross-sectional study—Report numbers of outcome events or summary measures	11-17
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	13-17
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	17-23
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	23
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	24
Generalisability	21	Discuss the generalisability (external validity) of the study results	
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	25

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.
Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.