Effects of physical exercise on mental health and general self-efficacy of city residents in COVID-19

Jianyu Jia[1], Li Song[2], Lin Li[3]*

Abstract

The purpose of this study was to investigate the relationship and impact of residents' self-efficacy and mental health in the context of COVID-19. A quantitative research approach is used in this study. This study investigated residents with a general self-efficacy questionnaire to explore the predictive effect of self-efficacy on mental health. Therefore, a questionnaires survey is employed in this study to collect primary data. While data collection, the cross-sectional research design was used, and data analysis was carried out using a statistical tool. There was a significant negative association between the epidemic's risk perception and the score of the SCL.90. The standardized burden of understanding the epidemic on its latent variables was more than 0.65 in the measurement model, indicating that the 90 percent confidence intervals for the three mediation paths did not include 0, confirming the mediation effect's establishment. This study reveals the relationship between self-efficacy and mental health and its mechanism of action, inspiring the maintenance of residents' mental health during the period of the new crown. It is concluded that there was a significant positive correlation between self-efficacy and understanding of the epidemic situation.

Keywords: COVID-19; mental health; Self-efficacy; physical exercise

Introduction

Novel coronavirus ("COVID-19" for short) is a respiratory disease (Levine et al., 2022; Şimşek et al., 2020) characterized by experts such as Zhong Nanshan, head of the high-level expert group of the National Health and Medical Commission and academician of the Chinese Academy of Engineering, found through the comparison and analysis of virus sequences that from all aspects of epidemiological investigation. It is feasible to compare the virus's origins in wild animals (Romero-Blanco et al., 2020). It is enormous, highly contagious, and highly toxic and is mainly spread via four modes of transmission: droplets, hand pollution, eye masks, and breathing. In the face of the new coronary epidemic, although physical exercise cannot directly help college students prevent new coronary, it can play a positive catalytic role in the body's physiological and psychological intervention. As long as a certain amount of scientific physical exercise is carried out, the physical immunity of college students can be further enhanced, the body's ability can be improved, and various psychological contradictions and defects can be corrected at the same time. The healthy development of the body and mind can be promoted.

Novel Coronavirus shows a strong infectious and latent phenomenon of human transmission. The infected patients are usually accompanied by fever, cough, dry sickness and eventually dyspnoea. Coronavirus is a common virus in nature. It is named because it looks like a crown. 2019-nCoV belongs to a kind of coronavirus (Marazziti et al., 2021). It is confirmed that 2019-nCoV is transmitted primarily by close coughing or sneezing droplets. Clinically, it shows fever, imaging characteristics of average or decreased total leukocyte count in the early stage, or reduced lymphocyte count. Known viruses mainly invade the human immune system and replicate in large quantities, attack the human immune system and cause damage to other systems. Research shows that physical exercise has an impact on the body's immunity. Long-term regular and moderate exercise can improve the body's immunity, increase virus resistance and reduce the probability of virus invasion into the body (Nlda et al., 2021).

As an essential concept in Bandura's social cognition theory, self-efficacy refers to individual self-efficacy. The confidence or belief that one can successfully deal with internal and external environmental events. With the change in the medical model, the influence of psychological factors on health has been paid more and more attention (Zhou et al., 2021). Among them, the role of self-efficacy in promoting physical and mental health has been widely concerned. Studies have shown that low

[1] School of Economics, Beijing Technology and Business University, Beijing, China
[2] School of Economics, Beijing Technology and Business University, Beijing, China
[3] Lyceum of the Philippines University, Manila, Philippines
Corresponding author's Email: lin.li@lpu.edu.ph

self-efficacy is significantly correlated with emotional exhaustion, stress and depression.

Simultaneously, Zhang Yan and Chen Fuguo demonstrated self-efficacy and mental health in their review. Self-efficacy was positively associated with coping style, defence style, and subjective well-being but negatively related to negative emotions such as depression, anxiety, and depression. A recent poll conducted during the avian influenza outbreak revealed a significant negative correlation between self-efficacy and negative feelings associated with the epidemic (Martell et al., 2021). Jetlag points out that he has a higher sense of self-control and self-efficacy than he has a higher sense of self-control. Higher self-efficacy makes individuals behave more positively in the face of problems, usually attributing the positive results to their efforts. The negative consequences are attributed to unstable external factors; Individuals with low self-efficacy often doubt themselves and feel unable to cope with the current situation. Then there are psychological problems such as anxiety and worry (Mohammed et al., 2021).

White blood cells are the body's main body to perform immune functions, an essential part of the blood, and an important part of the body's defence system, including granulocytes, monocytes, lymphocytes, etc. White blood cells can eradicate a variety of harmful microbes and purify blood and maintain normal system function by removing allergies, aged, dead, and aberrant cells. Leukocytosis can be seen in disease and non-disease factors. Disease factors are various infectious diseases. Non-disease factors include strenuous exercise and high temperature. The effect of exercise on leukocytes is shown in that exercise induces different changes in interleukin, and exercise training can be used to regulate natural immune function. Some scholars have also proved that exercise of different intensities and durations can cause peripheral blood granulocytes, monocytes, natural killer cells and T and B lymphocytes to increase to varying degrees, especially neutrophils. Exercise has a benign response to the body's immune cells.

Hypotheses

The current study proposed various hypotheses to achieve the study objective. Based on the hypothesis, H1: Self-efficacy plays a protective role in the mental health status of residents during the epidemic. Literature also shows a positive part of self-efficacy in mental health (Kamkari, 2022; Zhou et al., 2021). The degree of Novel coronavirus knowledge is about the degree of understanding of the disease. Individual self-efficacy can affect personal behaviour choices. Previous studies have shown that self-efficacy can significantly predict autonomous learning behaviour. BA Duochang Jing and Gan Yanfen found that self-efficacy affects autonomous learning behaviour through four aspects: motivation of independent learning, selection process of learning tasks, learners' physical and mental reaction process and learning strategies (Hossain et al., 2020).

Self-efficacy was positively connected with awareness of breast cancer-related knowledge in research on migrant women. Additionally, the study demonstrates that one's comprehension of epidemic knowledge can considerably predict one's level of psychological worry during an avian influenza epidemic. Su Huimin, Ouyang Liying and Qiu Fangling took 50 diabetic foot patients as the subjects. After 12 weeks, given knowledge, belief, and behaviour intervention, the experimental group's negative emotion and self-feeling burden decreased significantly compared with the control group (Sugg et al., 2022). Therefore, during Novel coronavirus, patients may show strong learning motivation and effective learning strategies to understand the new crown epidemic. This helps people understand the status quo and rationally view the epidemic situation, so asunderstand the status quo and rationally view the epidemic situation to reduce possible psychological problems.

Therefore, it is assumed that H2: During the novel coronavirus outbreak. Understanding the epidemic situation plays a partial intermediary role between residents' self-efficacy and mental health.

Individuals with low self-efficacy are more damaging in the face of risk situations, easily exaggerate difficulties, have higher risk perception, and are often in high vigilance, mental tension, and anxiety—adverse effects on mental health.

Put forward the research hypothesis H3: During the outbreak of novel coronavirus, the risk perception of the epidemic played a partial mediating role between residents' sense of efficacy and mental health. This study found that stress perception plays a complete intermediary role between self-efficacy and mental health. Specifically, the higher the degree of self-efficacy, the lower the level of individual stress perception, and stress perception can significantly affect mental health (Alygizakis et al., 2021). Stress perception refers to a psychological feeling produced by individuals after self-cognitive evaluation of stressful events in their environment. Stress perception has been implicated in several psychosomatic diseases, including anxiety disorder, depression, post-traumatic stress disorder, obsessive-compulsive disorder, cardiovascular disease, and digestive system disease. Therefore, self-efficacy can alleviate the experience of stress perception and

then reduce the occurrence of mental health problems (Espoir & Amantha, 2020).

Moderate-intensity exercise has an essential effect on NK cells, increasing their activity and improving immunity. Moderate-intensity exercise increased NK cell activity by 57%. The longer the Taijiquan exercise time, the more pronounced the synergistic effect of CD55 and CD59 on lymphocytes and red blood cells, and it has a significant impact on fighting against the decline of age-dependent immune function. Most studies have confirmed that physical exercise has a good effect on enhancing the immune response of lymphocytes. Long-term regular physical exercise can enhance the defence ability of the immune system and positively affect one's own immunity and reduce and positively improve one's immunity and reduce virus invasion.

Research methods

research object

900 residents in an area were selected as subjects by random cluster sampling. After informed consent, the anonymous test was conducted with unified guidelines. 20 questionnaires that did not answer carefully were excluded, and 880 valid questionnaires were recovered, with an effective questionnaire rate of 97.8%. The average age of the subjects was 28 ± 15 years old; There were 435 males (49.4%) and 445 females (50.6%).

Measuring tools

(1) Self-efficacy

The Chinese version of the general self-efficacy scale (GSES) revised by Zhang and Schwarzer was used, with 10 items and 4-point scoring in liken style. The scale contains only one dimension. The higher the score, the stronger the sense of self-efficacy. The internal consistency reliability coefficient Cronbach's α is 0.87. The test-retest reliability was 0.83, and the split-half reliability was 0.82. It shows that the scale has good reliability. Through factor analysis, it was found that the first eigenvalue accounted for 52% of the total variance, more than 20%, which confirmed the unidimensionality of the scale structure. It also established the predictive validity of the scale for anxiety. In this study, the Cronbach's αt of the scale was 0.905.

(2) Knowledge of the epidemic situation

This study examined public awareness of SARS during the SARS outbreak. Five areas of the covid-19 pandemic situation were assessed: symptoms, epidemic state, scientific research progress, transmission routes, and prevention actions (Zhu & Liu, 2020). It covers five subjects, including "my grasp of current scientific research advances on the pandemic," which is worth seven points, and a range of one to seven points, ranging from "not knowing at all" to "extremely understanding." Cronbach's alpha coefficient is 0.853 in this study. Table 1. Questionnaire on COVID-19

How concerned are you about the fight against the new pneumonia epidemic? ( )
A. Very concerned B. Relatively concerned C. Average D. Not very concerned E. Not concerned
From what you know, how are the local public's response and attention to the new crown epidemic? ( )
A. Not paying enough attention B. Being able to take it seriously and correctly C. Overreacting
(Multiple choices) How would you feel if someone around you has been diagnosed with the new coronavirus? ( )
A. Fear B. Worry C. Anxiety D. Indifferent E. Optimistic F. Helpless G. Panic H. Sad I. Anger J. Calm K. Others (please write specific feelings)
(Multiple choices) In response to this epidemic, have you and your family members behaved in the following ways? ( )
Excessive buying of masks B. Buying Shuanghuanglian oral liquid C. Unintentionally spreading rumours on the Internet D. None of the above
In the message you got _____?( )
A. There is more positive news B. The positive and negative news is almost the same C. There is much negative information

(3) Risk perception of epidemic situation

Refer to the questionnaire compiled by SARS for measuring the dimensions of risk characteristics. In this study, 11 items were designed to measure the risk perception in terms of anxiety, risk nature, controllability and infection probability of new coronaviruses, such as "what is the probability of my infection with a new coronavirus ?" The questionnaire was scored 7 points. Cronbach's αt calculated from this sample is 0.668.

(4) Mental health status

The 90 item symptom checklist 90 (SCL. 90), translated by Wang Zhengyu, was used in this study. The scale consists of ten dimensions: somatization, compulsion, interpersonal sensitivity, depression, anxiety, hostility, terror, paranoia, psychosis and others (mainly measuring sleep and diet). Liken5 points are used for scoring. From "no symptoms" to "severe symptoms", score 1-5 points respectively. SCL.90 has been widely used in the study of

mental health since the 1980s. In addition, the study also confirmed the excellent content validity and structure validity of the SCL.90 scale. The internal consistency reliability calculated based on this sample is 0.975.

Data processing

SPSS 21.0 analysed standard method deviations, descriptive statistics, and correlations between significant variables. Construct a structural equation model using the amos23.0 program. The model considers self-efficacy as the white variable, awareness of the epidemic, risk perception as the intermediate variable, and mental health status as the dependent variable while controlling for gender, age, education, and family structure (Zwingmann,2021). The bootstrap method is used for mediating effect test. The set sample size is 2000, the sampling methods are percentile bootstrap method and bias-corrected nonparametric percentile method, and the robust standard error and 90% confidence interval of parameter estimation are obtained. The mediating effect is significant if the 90% confidence interval does not contain zero.

Analysis of the relationship between physical exercise and immunity

(1) The effect of physical exercise on white blood cells. White blood cells are the main body of the body's immune function, an essential part of the blood, and an important part of the body's defence system, including granulocytes, monocytes, lymphocytes, etc. White blood cells can eliminate various pathogenic microorganisms, purify the blood, and maintain the regular operation of multiple systems by removing allergens, ageing, and dead and abnormal cells. Leukocytosis can be seen in disease and non-disease factors. Disease factors are various infectious diseases. Non-disease factors include strenuous exercise and high temperature. The influence of exercise on leukocytes is manifested in that exercise induces different changes in interleukins, and exercise training can be used to regulate natural immune function. Some scholars have also proved that exercise of different intensities and durations can cause peripheral blood granulocytes, monocytes, natural killer cells and T and B lymphocytes to increase to varying degrees, especially neutrophils. Exercise has a benign response to the body's immune cells.

(2) The effect of physical exercise on lymphocytes

Lymphocytes are primarily involved in the defence against external pathogens and monitoring cell mutations within the body. T lymphocytes, B lymphocytes, and natural killer cells (NK cells) are all types of lymphocytes. T lymphocytes are engaged in the body's cellular immunity, B lymphocytes are involved in humoral immunity, and NK cells are involved in the body's innate immunity. NK cells can directly destroy viruses. Infected self cells or tumour cells, this specific and non-specific immunity make the body produce corresponding immune responses and maintain the related balance of the body. The increase in the number of lymphocytes can be seen in various infectious diseases. The decrease in the number can be found in the acute phase of some contagious diseases, applying adrenal cortex hormone therapy.

Reactive lymphocytes (abnormal lymphocytes) can be found in some viruses. When the body is infected, the lymphocytes participate in the anti-pathogen response to activate and become activated lymphocytes, and lymphocytes with evident variation compared with the conventional form can be detected in the peripheral blood. Moderate-intensity exercise has been shown to significantly affect NK cells, increasing their activity and enhancing immunity. Exercise at a moderate level improved NK cell activity by 57%. The longer the duration of Taijiquan training, the more pronounced the synergistic effect of CD55 and CD59 on lymphocytes and red blood cells, which substantially affects combating age-related immune function decrease.

The majority of studies have established that physical activity has a beneficial influence on lymphocyte immune response enhancement. Long-term, consistent physical activity can boost the immune system's defence capability, improving one's immunity and minimizing virus invasion.

(3) Effects of physical exercise on other immune-related substances

Studies on exercise and immunity have shown that exercise of different intensities and durations can cause various degrees of increase in the number of peripheral blood-related immune cells and high expression of IL-15. At the same time, exercise can inhibit or promote monocyte-macrophage function and change the activity of NK cells, which mainly depends on the size and method of exercise load. In addition, long-term regular exercise can increase the number or function of peripheral blood Treg cells, and increase the secretion of anti-inflammatory cytokines, thereby weakening the inflammatory response;

immune response. Some studies have reported that regular exercise can also enhance the body's resistance to infection, and long-term aerobic exercise can improve the body's immunity and reduce respiratory infections. Long-term strenuous exercise can cause apoptosis of immune cells (mainly immature T cells), damage cellular immune function, and increase the incidence of upper respiratory tract infections is beneficial.

(4) The relationship between physical exercise and prevention of 2019-nCoV

Viral infection has been found to impact the expression of immune cells via immune regulation, and 2019-nCoV is a coronavirus type associated with immune regulation influencing immune cells. Fever, dry cough, shortness of breath, typically low or low white blood cell count in peripheral blood, and inflammatory alterations on chest X-rays are all clinical characteristics of 2019-nCoV. According to the current diagnosis, individuals of all ages may be infected, but the infection rate in children is relatively low, and most infected individuals are adults. Among them, the elderly and the infirm appear to be more susceptible. Because the immune system of the elderly and infirm groups is low, they are more likely to be infected by bacteria, viruses, and fungi. Therefore, during the infection process of 2019-nCoV, they will be more susceptible to infection or infection due to low immunity than the general population with solid immunity. Symptoms after infection show severe features. Some people will get sick with the same virus carriers, and some will not get sick. Those who do not get sick are primarily people with strong immunity, so in the face of the solid infectious power of the virus, the body relies on its immune system to resist the invasion of the virus seems very important. Currently, there are no critical treatments in the field of viruses available in hospitals, and doctors will boost their own immunity by conditioning the patient's body to treat the virus. In addition to frequent handwashing and wearing masks, it is critical to strengthen immunity to limit the risk of infection from a comparable 2019-nCoV infection. Studies have shown that long-term regular moderate-intensity exercise can increase immune function. In preventing new coronavirus infection, improving one's own immunity is the most effective way for people to fight the virus. Studies have confirmed that regular exercise can also enhance the body's resistance to infection.

Long-term aerobic exercise can improve the body's immunity. The cells showed a good response and reduced the chance of disease in the respiratory tract. Secondly, it also has a good impact on patients with later prognoses. Studies have shown that after aerobic exercise, patients' resting heart rate, systolic blood pressure, diastolic blood pressure, pulse pressure and cardiac function index were significantly improved, and pulmonary function also showed good performance. , FVC, MVV indicators have been significantly improved, more evident than the conventional exercise, more able to achieve the therapeutic effect. Therefore, regular physical exercise is critical to one's immunity. The improvement of immunity can increase the resistance to the outside world, similar to 2019-nCoV, reduce the chance of the virus invading the body, and in terms of prognosis, regular small and medium-intensity physical exercise. It also plays a good role in the recovery of the body.

Results and Discussion

Common method deviation control and inspection

Residents completed numerous questionnaires in this study, introducing methodological bias. This study aimed to compare the response sentences to four self-report questionnaires, control the common method deviation through accuracy, comprehension, influence, compliance, and anonymous filling, and conduct statistical analysis using the Harman single factor test. The results show that the characteristic root of 23 factors is greater than 1, and the variance interpretation rate of the first factor is 25.751%, which is less than the critical standard of 40%. It shows that there is no obvious common method deviation in the data of this study.

Descriptive statistics and correlation analysis of main variables

The results of the correlation analysis are shown in Table 2: there is a significant positive correlation between self-efficacy and understanding of the epidemic situation. There was a significant negative association between the epidemic's risk perception and the SCL.90 score. There was a substantial negative link between comprehension of the epidemic scenario and risk perception of the epidemic situation and the SCL.90 score. There was a significant positive association between risk perception and SCL.90 score in epidemic situations. The average, standard deviation, and correlation coefficient for each research variable are shown in Table 2.

Table 2

Average, standard deviation and correlation coefficient of each research variable

	M	SD	1	2	3
1. Self-efficacy	25.33	6.62			
2. Knowledge of the epidemic	28.84	4.68	0.28***		
3. Risk perception of the epidemic	44.07	9.94	-0.14***	-0.14***	
4. The SCL - 90 score	110.56	31.84	-0.16***	-0.14***	0.13***

Intermediary test of understanding of epidemic situation and risk perception

The structural equation model was used to analyze the impact of self-efficacy on SCL.90 score and test the mediating effect of knowledge of the epidemic situation and risk perception on the relationship between self-efficacy and SCL.90 score. Construct a structural equation model with self-efficacy as exogenous variables, understanding the epidemic as endogenous latent variables, risk perception of the epidemic and SCL.90 score as endogenous variables, and gender, age, education and family structure as control variables. In the measurement model, the standardized load of the understanding of the epidemic situation on its latent variables is more than 0.65, which shows that the measurement of the latent variables by the observed variables is fully effective.

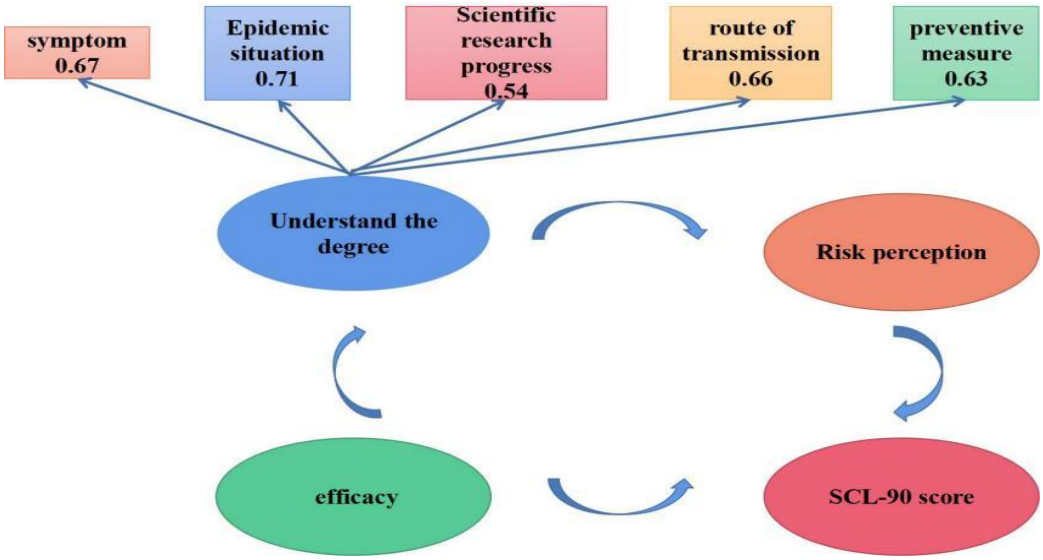

Figure 1. Equation test of epidemic understanding and risk assessment

The structural equation test findings for the chain-mediated influence of residents' self-efficacy and SCL.90 score on their understanding of the epidemic situation and risk assessment indicate that the research data fit the model well, as indicated by the fitting index in Table 3. Figure 1 shows that residents' self-efficacy can significantly positively predict their understanding of the epidemic ($b = 0.30$, $P < 0.001$), significantly negatively predict their risk perception of the epidemic ($P = -0.10$, $P < 0.01$) and SCL-90 score ($P = -0.1l$, $P < 0.01$). Knowledge of the epidemic situation had a significant negative predictive effect on risk perception ($P = -0.12$, $P < 0.01$). In addition, risk perception significantly positively predicted SCL.90 score ($P = 0.09$, $P < 0.01$). It should be noted that the predictive effect of knowledge of the epidemic situation on the SCL.90 score is marginally significant ($P = 0.07$, $P = 0.05$). This shows that residents' self-efficacy will have a significant indirect impact on SCL.90 score through the intermediary effect of their understanding of the epidemic situation. Self-efficacy will also significantly impact SCL.'s 90 score through the intermediary effect of their risk perception of the epidemic situation. At the same time, understanding the epidemic situation and risk assessment play an intermediary chain role in residents' self-efficacy and SCL.90 score. Table 3 shows the fitting index of the mediation model.

Table 3

Fitting index of the mediation model

Model	X2	df	X2/df	GFI	CFI	TLI	NFI	RMSEA
Intermediary effect model	100.731	30	1.617	0.868	0.861	0.844	0.846	0.033

Further, the percentile bootstrap method and the percentile bootstrap method with deviation correction were used to test the mediating effect. Through repeated random sampling with the return, 2000 bootstrap samples were taken from the original research data ($n = 880$), and the bootstrap 90% confidence interval of mediating effect was calculated. The results are shown in Table 4. The 90% confidence interval of the three intermediary paths does not include 0, whether it is the percentile bootstrap method or the percentile bootstrap method with deviation correction, which confirms the establishment of the intermediary effect. Table 4 shows the bootstrap 90% confidence interval of the indirect path.

Table 4

Bootstrap 90% confidence interval of the indirect path

The path	Effect of value	Boot SE	Bias-Corrected 90% CI		Percentile 90% CI	
			Lower	Upper	Lower	Upper
Self-efficacy → knowledge of the epidemic →SCL-90 score	-0.022	0.012	-0.042	-0.002	-0.042	-0.002
Self-efficacy → epidemic risk perception →SCL-90 score	-0.010	0.005	-0.022	-0.003	-0.019	-0.002
Self-efficacy → risk degree of epidemic → risk perception of epidemic → Scl-90 score	-0.003	0.002	-0.007	-0.001	-0.006	-0.001

As we all know, physical exercise can improve a person's physical immunity, but few people find that long-term physical exercise can also play a positive role in intervening in psychological quality. For example, physical exercise can cultivate strong will and promote emotional development. And relieve stress and reduce anxiety. (1) Urban residents are in their adolescence. They like to challenge and try some extreme and heavy-duty sports when exercising. It is easy to cultivate a strong will and quality in the process. Grasp the rhythm of life well and face adversity bravely. (2) Due to the needs of competitive sports competitions, most sports competitions need the cooperation of teammates to complete the competition better. While it is impossible to improve relationships during the COVID-19 outbreak through direct offline games, you can communicate and share your own sports anecdotes online to convey previously suppressed feelings and foster emotional development among urban people. (3) With the impact of the new crown epidemic, many urban residents are in a state of high tension and anxiety, such as employment pressure, postgraduate entrance examination and civil servant examination pressure, etc., may also cause insomnia due to anxiety. Physical exercise can increase the metabolic rate of human organs, enhance specific metabolic pathways, regulate the nervous system, and has a significant therapeutic effect on autonomic nervous system illnesses and neurosis. The results show that residents' general self-efficacy positively affects their mental health, consistent with the previous research results. (the core concept of dura's social cognitive system, self-efficacy regulates individual health from two aspects: First, the individual's cognition of their ability to deal with stress events will impact their physical and mental regulation system. Second, self-efficacy directly affects individuals' control of health-related habits, such as adhering to healthy habits. The relationship between self-efficacy and mental health has its physiological basis. Biochemical tests have revealed that self-efficacy is associated with autonomic nerve arousal and the secretion and release of neurotransmitters such as catecholamines and endogenous opioids, which are involved in the immune system's functional regulating activities. Lack of self-efficacy will significantly improve the biochemical level of these neurotransmitters in vivo, which will lead to the reduction of immune function. In addition, some studies have shown that self-efficacy is related to mean arterial pressure, systolic blood pressure, diastolic blood pressure and pulse pressure, and then affects individual physical and mental health. Thus, throughout the new coronavirus prevention and control phase, increasing residents' self-efficacy and sense of control over their condition will assist them in accurately assessing their ability to cope with the epidemic scenario and improve their mental health during the epidemic.

The impact of general self-efficacy among urban residents on mental health during the outbreak

The results show that the general self-efficacy of urban residents has a positive predictive effect on their mental health, which is consistent with the previous research results. Previous studies also show a positive relationship between self-efficacy and mental health (Carpinello et al., 2000; Mo et al., 2021; Sørensen et al., 2019; Sun et al., 2021). Therefore, the results of this study are consistent with the literature. As the core concept of Bandura's social cognition system, self-efficacy regulates individual health from two aspects: first, the individual's cognition about one's own ability to deal with stressful events will have an impact on their physical and mental regulation system; second, Self-efficacy directly affects an individual's control over health-related habits, such as sticking to healthy habits. In addition, the relationship between self-efficacy and mental health has a physiological basis (Kumar et al., 2020; Zhao et al., 2021; Zwingmann et al., 2021).

Self-efficacy is related to autonomic arousal and the secretion and release of neurotransmitters such as catecholamines and endogenous opioids, which are involved in the functional control of the immune system. Inadequate self-efficacy can result in a large increase in the physiological levels of these neurotransmitters in the body,

resulting in impaired immunological function. Additionally, studies have demonstrated a relationship between self-efficacy and mean arterial pressure systolic, diastolic, and pulse pressure, all of which affect an individual's physical and mental health. Therefore, during the prevention and control of the new coronary epidemic, the self-efficacy of urban residents should be enhanced and their awareness of the status quo should be improved. It helps them to correctly understand their ability to cope with the epidemic, and helps to improve the mental health of urban residents during the epidemic.

Conclusion

This study found the relationship between self-efficacy, stress perception, psychosomatic symptoms and mental health, which provides some enlightenment for improving the mental health level of residents during the epidemic of coronavirus: First, novel coronavirus should be relieved by combining the publicity and education of new crown prevention and control knowledge. Second, group therapy such as hypnotic relaxation and mindfulness decompression can be carried out regularly to alleviate nurses' sense of stress and burnout and reduce various psychosomatic reactions caused by psychological stress.

Deficiencies of this study are: First, the sample size is small, and the research objects are all from the same community. In future research, the research scope can be expanded. The selection of subjects is no longer limited to a specific area, and more reliable data can be obtained; Second, in addition to self-efficacy, stress perception and psychosomatic symptoms, there may be other influencing factors affecting mental health, as well as their two-way effects, which need to be further explored.

Relevant government departments, news media and colleges and universities should publicize the knowledge of health and physical exercise, guide residents to establish a reasonable concept of exercise, internalize the idea of health in the heart and externalize it in the line, and form a good awareness and habit of exercise. Especially in the fight against the epidemic, we should strengthen physical exercise to strengthen our health, resistance, and immunity. We should have more responsibility and responsibility, cherish life more, fear more, and improve our psychological quality.

However, this study has some limitations, which need further improvement in future research. First, this study is cross-sectional and cannot infer a causal relationship. The causal association between factors can be studied further in future study through experimental experiments or follow-up investigations. Second, this study surveyed participants via a self-reported questionnaire. Self-report bias may exist, impairing the quality and reliability of the information acquired. In future research, methods such as questionnaires and interviews can be used to measure variables better. Third, in this study, the internal consistency coefficient of the self-compiled risk perception scale is only 0.667, and the low reliability may affect the research results. Future research can further explore by using scales with better reliability and validity. Fourth, the explanatory power of self-efficacy for mental health is limited because mental health is simultaneously affected by many factors, such as resilience, socioeconomic status, and social support. Self-efficacy is only one factor. Future research can comprehensively consider the influence of multiple factors on mental health and the relationship between these influencing factors.

Theoretical Implications

Theoretically, the current study has significant implications because this study addressed a unique relationship between residents' self-efficacy and mental health. Most importantly, this relationship is considered in the context of COVID-19, which is unique in nature. This study provided several implications by considering the knowledge of the epidemic. Other studies considered COVID-19, but the literature has ignored the role of knowledge of the epidemic, which can play theCOVID-19, but literature has ignored the role of knowledge of the epidemic, which can play the most significant role. Additionally, previous studies on COVID-19 have not considered risk perception of the epidemic. Although risk perception of the epidemic is most important to study, it is not comprehensively addressed by the literature. Therefore, this study provided important implications by considering the role of risk perception of the epidemic. Hence, by considering the residents' self-efficacy and mental health, this study also addressed risk perception of the epidemic and role of knowledge of the epidemic.

Practical Implications

As COVID-19 is one of the viruses that spread swiftly throughout the world, it disrupted operations on a large scale, resulting in casualties. Thus, the current study is critical in terms of human mental health. The study's unique association between residents' self-efficacy and mental health has significant consequences. According to the study's findings, physical activity significantly impacts residents' mental health. Physical activity can help practitioners promote the mental health of individuals with COVID-19. Additionally, the mental health of COVID-19 patients can be enhanced with a high degree of awareness about the disease and favourable risk perception.

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