

# The Mediating Effect of Perceived Social Support and Medical Coping Modes Between Psychological Resilience and Meaning in Life in COVID-19 Patients

Lin Zhang<sup>1</sup>, Ming Jiang<sup>2</sup>, Linghua Wang<sup>1</sup>, Jiandi Zheng<sup>1</sup>, Weigang Wang<sup>2</sup> 

<sup>1</sup>Zhejiang Hospital of Integrated Traditional Chinese and Western Medicine, Hangzhou, 310018, People's Republic of China; <sup>2</sup>Department of Statistics and Mathematics, Zhejiang Gongshang University, Hangzhou, 310018, People's Republic of China

Correspondence: Weigang Wang, Email wangweigang@zjgsu.edu.cn

**Aim:** Assess the level of meaning in life of patients with COVID-19, explore the relationship among COVID-19 patients in perceived social support, medical coping modes, psychological resilience and life meaning, and clarify the mediating effect.

**Methods:** Through the convenience sampling method, 144 COVID-19 patients were selected in the year 2021, and surveyed by using general information questionnaire, perceived social support scale (PSSS), medical coping modes questionnaire (MCMQ), meaning in life questionnaire (MLQ) and Connor-Davidson resilience scale (CD-RISC). After the collected data were preprocessed by SPSS, the *t*-tests, multiple comparison and Pearson coefficient were respectively used for comparative analysis, difference analysis and correlation analysis. Based on the above analysis, the structural equation model of perceived social support, medical coping modes, psychological resilience and meaning in life of COVID-19 patients was established by Amos.

**Results:** COVID-19 patient's score of meaning in life, perceived social support, medical coping modes and psychological resilience are higher than the medium level. The gender and the place of treatment have significant differences in the meaning of life and perceived social support respectively. The patient's sense of life meaning is closely and positively related to the perceived social support, medical coping modes and psychological resilience. Psychological resilience indirectly affects the sense of life meaning through medical coping modes and perceived social support.

**Conclusion:** The life meaning can be improved by strengthening the perceived social support. The high level of perceived social support was conducive to the patient to think about life from a positive perspective. Family, government, enterprise and others should give patients certain care and warmth, make them feel more support from all walks of life. In addition, the life meaning can also be enhanced through the impact of psychological resilience on medical coping modes. So, care-givers can take some proper psychological interventions to patients.

**Keywords:** COVID-19, perceived social support, medical coping modes, psychological resilience, meaning in life, mediation effect

## Introduction

Corona Virus Disease 2019 (COVID-19) is an acute respiratory infectious disease. The main clinical manifestations of the disease are fever, weakness of the limbs, cough, difficulty breathing, etc. In severe cases will appear acute respiratory distress syndrome, sepsis shock, multiple organ dysfunction syndrome and other symptoms.<sup>1</sup> Patients infected with this virus not only suffer the above-mentioned physical pain, but also affect their physical and mental health due to new virus infection, related treatment methods and surrounding panic emotions, which are mainly manifested as changes in self-cognition, life attitude and sense of life meaning. Meaning in life is a significant understanding and experience of an individual to himself and life, acquiring and maintaining a sense of meaning is one of the basic motivations of human beings. Meaning in life emerged as a protective factor against suicidal ideation, suicide attempt,<sup>2</sup> higher sense of meaning in life helps patients fight the virus with an optimistic and tenacious attitude, more actively cooperate with disease treatment, then promote the recovery of physical and mental health. However, demoralization emotions such as

hopelessness, loss of meaning and lack of support from others may contribute to suicidal behavior.<sup>3</sup> Therefore, paying attention to the psychological status of COVID-19 patients is of great important to improving their life quality.

Many scholars at home and abroad have studied the relevant factors affecting the meaning in life, Kim (2010) pointed out that cancer patient's perceived social support is positively correlated with the level of life meaning, Ye (2018) investigated patients after breast cancer also reached similar conclusions. Costanza Alessandra (2020) highlights the relationships between meaning in life and interpersonal support. The research results of Wang (2021) show that adolescent's perceived social support plays a mediating role between meaning in life and mobile phone addiction. Zhou et al investigated college students and found that meaning in life is affected by perceived social support and psychological resilience plays a partial role. Adilan (2021) found that the influencing factors of life meaning in patients with advanced cancer can be summarized as three factors, positive factors—positive character characteristics, positive social support and positive spiritual support, negative factors—unacceptable mentality, negative character characteristics and side effects of treatment, objective factors—huge economic pressure, changes in external images and lifestyle. Xia et al found a close relationship between peritoneal dialysis patient's life meaning, perceived social support and medical coping modes, among them family support and face are the main influencing factors of the patient's life meaning.

To sum up, most scholars have pointed out that the main factors affecting the meaning in life are psychological resilience, perceived social support and medical coping modes, while the current study on the relationship between the above four in COVID-19 patients is still blank. Therefore, this paper intends to investigate COVID-19 patient's perceived social support, medical coping modes, psychological resilience and meaning in life, then explore the relationship and influence mechanism among the four, in order to provide a theoretical basis for the intervention care and enhancement of life meaning of COVID-19 patients.

## Object and Methods

### Research Objective

We conducted the present study based on convenient sampling in Hangzhou, recruited 144 patients who had recovered from COVID-19 before July 2021. Due to the government's reasonable control measures and the active cooperation of the masses, except for some high-risk areas, there are not many confirmed cases of COVID-19, so only 144 samples. And the virus is extremely contagious, so the questionnaire was recovered patients. The inclusion criteria were as follows: (1) Pathological diagnosis of COVID-19 and current recovery (2)  $\geq 18$  years of age (3) Able to understand and complete the questionnaire independently (4) Informed consent and voluntary participation in the study. The exclusion criteria were as follows: (1) Concomitant with other serious diseases (2) Other major life events occurred after COVID-19 diagnosis, such as death of relatives, car accident, etc. (3) visual or hearing impairment in communication.

### Instruments

#### General Information Questionnaire

According to the purpose of the research, designed the patient general information questionnaire, which mainly includes general demographic characteristics such as gender, age, educational level and marital status, as well as information related to disease treatment such as the time from illness to recovery and the place of treatment.

#### Perceived Social Support Scale

Perceived social support scale (PSSS) was revised by Jiang<sup>4</sup> based on the perceived social support multidimensional scale, and the scale includes three dimensions: family support, friend support, leadership, relatives and colleagues support. PSSS is a 12-item questionnaire that uses a 7-level scoring method (from 1 = "disagree" to 7 = "extremely agree"), higher scores indicate a higher level of the individual's perception of social support. The Cronbach's alpha of PSSS was 0.97, family, friend and other support's Cronbach's alpha coefficient are all more than 0.9, it shows that the reliability of the scale is good.

### Medical Coping Modes Questionnaire

Medical coping modes questionnaire (MCMQ) was compiled by Feifel et al<sup>5</sup> and domestic scholar Shen<sup>6</sup> convert it into Chinese, which is used to investigate the psychological and behavioral correlates of patients using primary coping strategies in the treatment of illness. MCMQ has 20 items in 3 dimensions, including confrontation (8 items), avoidance (7 items) and resignation (5 items), each item adopts Likert 4 score method (from 1 = “never” to 4 = “always”) and the total scores ranged from 20 to 80. The scores of three dimensions can reflect the tendency of the patient to adopt coping strategies when facing treatment. This scale has nine reverse score questions. The Cronbach’s alpha of confrontation, avoidance and resignation are 0.670, 0.483 and 0.778, the result reflect that seven items of the avoidance dimension have low consistency. According to the Cronbach’s alpha result that has deleted certain item, we chose to delete the eleventh question “Do you often try to switch topics when relatives and friends talk about your disease”. The Cronbach’s alpha coefficient of this dimension increased to 0.672 after deleted this item.

### Meaning in Life Questionnaire

The meaning in life questionnaire (MLQ) is usually used to evaluate an individual’s perception of life meaning and the cognitive level of life value and goals. Steger<sup>7</sup> divided the scale into two dimensions: presence of meaning in life (MLQP) and search for meaning in life (MLQS). MLQ is a 10-item questionnaire using a 7-level scoring method (from 1 = “not at all” to 7 = “completely”), and item 2 is a reverse score question. Higher scores indicate a better level of life meaning. The total Cronbach’s alpha of MLQ was 0.886, and two dimension’s Cronbach’s alpha coefficients were 0.911 and 0.74, so the data reliability of MLQS is higher than MLQP.

### Connor-Davidson Resilience Scale

Connor-Davidson resilience scale (CD-RISC) was originally compiled by American psychologists Connor and Davidson<sup>8</sup> in 2003, domestic scholars Yu et al translated and revised the CD-RISC which more suitable for Chinese. And they also adjust the original 5 dimensions into 3 dimensions according to the cultural background of our country, CD-RISC encompasses 3 subscales and 25 items: perception of tenacity (13 items), strength (8 items), and optimism (4 items). It is scored based on a Likert-scale ranging from one (never) and four (almost always). The total score ranges from 0 to 100, with greater resilience seen in those individuals who score more highly. The Cronbach’s alpha coefficient of this scale was 0.944, and the coefficients of the strength and tenacity dimensions were both above 0.9. However, the optimism dimension have to delete the third question of the scale “When my problem cannot be clearly solved, sometimes fate or God can help me”, and then the Cronbach’s alpha coefficient of optimism dimension increased from 0.377 to 0.738.

## Research Methods

The questionnaire method was adopted in this cross sectional study. Firstly, explain the purpose and significance of this questionnaire to the patients who meet the research standards, and promise that the survey was only used for scientific research. After obtaining consent, the questionnaire can be issued. During the survey, the investigator should pay attention to employ the contents and filling methods with unified instruction. Finally, the investigator checked leakage fill a vacancy, recalled it on the spot and checked the completeness to ensure the validity of the information. In this survey, 150 questionnaires were distributed and 144 valid questionnaires were returned, with an effective recovery rate of 96%.

## Statistical Methods

We sorted and analyzed the original data by using SPSS 21.0 and AMOS 26.0. Specifically, continuous variables that meet with the normal distribution were reported by mean values (M) and standard deviations (SD), and categorical variables were described by frequency (rate). *t*-test, ANOVA analysis were utilized for confirming the group difference between independent variables, and to multiple comparisons, we adopt GraphPad Prism 5. The Pearson correlation coefficient method is used to detect the correlation between perceived social support, medical coping modes, psychological resilience, and meaning in life. Since the sample size is not enough, when we use Amos 26.0 to establish

structural equations between four factors, we set the bootstrap number at 5000. The significance level was set to 0.05 (two-tailed).

## Ethics Approval

This study was approved by the Medical Ethics Committee of Red Cross Hospital (No:2022–140) and complied with the Declaration of Helsinki. The participants were informed that they had the right to withdraw from the study at any time. All of them were assured that their names, interview transcripts, and other personal data would be kept confidential.

## Results

### General Information of COVID-19 Patients

A total of 144 patients recovered from COVID-19 were included in this research eventually, and all the patients resided in Hangzhou, Zhejiang Province. The proportion of men and women are equal, and most of the patients between 31 and 40 years old. Of these 144 patients, 104 patients were married, 32 patients unmarried, 4 patient divorced, and 4 patient widowed. Other demographic and characteristic details are as exhibited in [Table 1](#).

**Table 1** The Demographic and Characteristic Information of COVID-19 Patients (n = 144)

Variable	Categories	n (%)
Gender	Male	72(50.0)
	Female	72(50.0)
Age	Between 18 and 25 years old	8(5.6)
	Between 26 and 30 years old	28(19.4)
	Between 31 and 40 years old	36(25.0)
	Between 41 and 50 years old	24(16.7)
	Between 51 and 60 years old	28(19.4)
	Over 60 years old	20(13.9)
Educational level	Junior high school and below it	20(13.9)
	High school	45(31.3)
	College degree	43(29.9)
	Bachelor degree	32(22.2)
	Master degree and above it	4(2.8)
Marital status	Married	104(72.2)
	Unmarried	32(22.2)
	Divorced	4(2.8)
	Widowed	4(2.8)
Family member	1	8(5.6)
	2	56(38.9)
	3	20(13.9)
	4	36(25.0)
	5	24(16.7)
Religious beliefs	Buddhism	4(2.8)
	Taoism	4(2.8)
	Others	16(11.1)
	No religion	120(83.3)
Profession	In-service staff	84(58.3)
	Retiree	40(27.8)
	Others	20(13.9)

(Continued)

**Table 1** (Continued).

Variable	Categories	n (%)
Recovery time	1–7 days	24(16.7)
	8–14 days	32(22.2)
	15–21 days	32(22.2)
	22–28 days	8(5.6)
	Over 28 days	48(33.3)
Treatment place	Outpatient	12(8.3)
	General ward	108(75.0)
	Intensive care unit	20(13.9)
	Others	4(2.8)

## The Scores of Perceived Social Support, Medical Coping Modes, Psychological Resilience, Meaning in Life, and Comparison with Domestic Norms

The total scores of PSSS, MCMQ, CD-RISC, and MLQ satisfied normal distribution. The mean score of MLQ was  $54.14 \pm 11.46$ , the MLQP and MLQS dimensions of this scale scored  $27.14 \pm 5.55$  and  $27.00 \pm 7.26$  respectively; whereas for MCMQ, it was  $47.86 \pm 3.29$ . And the mean score of PSSS was  $70.00 \pm 14.14$ . Among the three dimensions of PSSS, the score of family, friend and other support were  $23.58 \pm 4.90$ ,  $22.75 \pm 5.09$  and  $23.67 \pm 4.82$ . Other item scores were given in [Table 2](#).

Comparing the three dimensions of medical coping modes and the scores of psychological resilience and their respective dimensions with domestic norms, we found that among the seven items, only the resignation score lower than the norm, and the others are all higher than the norm. Except for strength and resignation dimensions, the differences were significant ( $P < 0.05$ ). The specific results can be seen in [Table 1](#).

## Differential Analysis in COVID-19 Patient's Perceived Social Support, Medical Coping Modes, Psychological Resilience, and Meaning in Life

In this paper, we take COVID-19 patient's perceived social support, medical coping modes, psychological resilience, meaning in life as dependent variables respectively, and separately take gender, age, education level, marital status, place of treatment as independent variables to do univariate analysis. If the number of independent variable more than two categories, we use multiple comparisons. As contained in [Table 3](#), gender ( $t = 5.437$ ,  $p < 0.05$ ) had a significant group difference in COVID-19 patient's life meaning. Through analysis, we also found treatment place had a significant group difference in COVID-19 patient's perceived social support. Since other item only include one sample, do not meet the requirement of multiple comparisons, so the item was deleted during pairwise difference comparisons. The specific content is shown in [Figure 1](#).

**Table 2** The Comparison of COVID-19 Patient's Psychological Resilience and Medical Coping Modes with Domestic Norms

Item	COVID-19 Patients (n=144)	Domestic Norm (n=560)	t	p
Tenacity	$37.14 \pm 7.87$	$31.26 \pm 4.21$	7.585	<0.001
Strength	$23.97 \pm 5.32$	$23.31 \pm 4.64$	0.820	0.413
Optimism	$10.81 \pm 2.36$	$9.56 \pm 3.33$	2.216	0.027
Psychological resilience	$71.92 \pm 14.64$	$65.40 \pm 13.90$	2.719	0.007
Confrontation	$22.75 \pm 3.27$	$19.48 \pm 3.81$	5.031	<0.001
Resignation	$8.64 \pm 2.64$	$8.81 \pm 3.17$	-0.315	0.753
Avoidance	$16.47 \pm 2.61$	$14.44 \pm 2.97$	4.002	<0.001

**Table 3** Differential Analysis in the Effect of Gender on COVID-19 Patient's Life Meaning

Variable	Categories	MLQ Score	t	P
Gender	Male	58.33±7.90	5.437	0.026
	Female	49.94±13.06		

## Correlation Analysis in COVID-19 Patient's Perceived Social Support, Medical Coping Modes, Psychological Resilience, and Meaning in Life

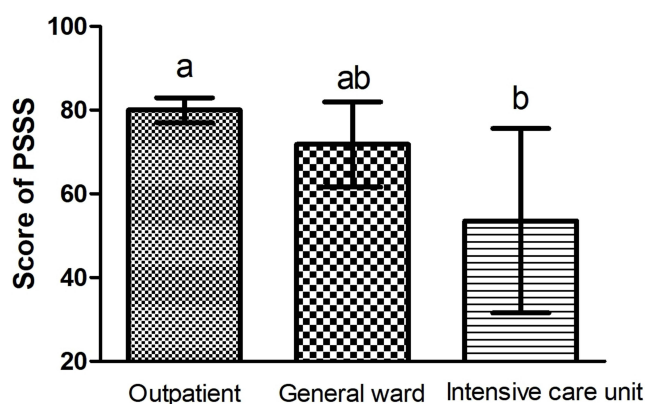
The Pearson correlation analysis showed that life meaning is positively related to perceived social support, medical coping modes and psychological resilience in patients with COVID-19 ( $r=0.609-0.730$ ,  $P<0.001$ ). Except for the correlation coefficient of MLP with resignation, MLS with resignation, MLS with confrontation, other correlation coefficients are all significantly positively correlated. The details are shown in Table 4.

## The Mediating Effect Between COVID-19 Patient's Perceived Social Support, Medical Coping Modes, Psychological Resilience, and Meaning in Life

We established a structural equation model between MLQ, MCMQ, PSSS, and CD-RISC through Amos 26.0 software, adopted maximum likelihood estimation to fitting model, added residual related path to some items based on the correlation analysis results between the four scales and the model correction indicators provided by the software. The parallel multiple mediation model shown in Figure 2, which reflects the situation where medical coping modes and perceived social support simultaneously play a mediating role between psychological resilience and the sense of meaning in life. The model fitting results showed that  $\chi^2/df=1.84$  ( $<3.000$ ),  $NFI=0.838$  ( $>0.800$ ),  $CFI=0.915$  ( $>0.900$ ),  $IFI=0.919$  ( $>0.900$ ),  $TLI=0.874$  ( $>0.800$ ), and  $RMSEA = 0.08$  ( $\leq 0.08$ ). All indicators are within acceptable range.

This study used bootstrap method to do 5000 times sampling, the confidence interval of Bias-corrected confidence intervals and percentile method were both 95%. The specific results are shown in Table 5. The confidence interval of "diff" which meaning the difference of two mediating effects included 0, it indicates that there is no significant difference between the mediating effect of medical coping modes and the mediating effect of perceived social support. The remaining mediating effects and total effects are all significant.

The mediation effect results show that to COVID-19 patients, psychological resilience causes a positive effect on medical coping modes approach ( $\beta=0.113$ ,  $P<0.05$ ), and perceived social support approach ( $\beta=0.452$ ,  $P<0.01$ ), perceived social support has a positive effect on meaning in life ( $\beta=0.334$ ,  $P=0.01$ ), medical coping modes has a positive effect on meaning in life ( $\beta=1.956$ ,  $P<0.05$ ). Medical coping modes and perceived social support play a complete mediating role in the psychological

**Figure 1** Differential analysis in the effect of treatment place on COVID-19 patient's perceived social support.

**Table 4** The Correlation Between COVID-19 Patient's Sense of Life Meaning and Perceived Social Support, Medical Coping Modes, Psychological Resilience

Variable	MLP	MLS	ML
MLP	1	0.595**	0.861**
MLS	0.595**	1	0.921**
ML	0.861**	0.921**	1
Family support	0.822**	0.488**	0.707**
Friend support	0.659**	0.560**	0.674**
Other support	0.771**	0.534**	0.711**
PSS	0.785**	0.553**	0.730**
Tenacity	0.628**	0.461**	0.595**
Strength	0.613**	0.397*	0.548**
Optimism	0.539**	0.345*	0.479**
Psychological resilience	0.646**	0.467**	0.609**
Resignation	-0.324	0.016	-0.146
Avoidance	0.597**	0.588**	0.661**
Confrontation	0.550**	0.058	0.303
MCM	0.761**	0.538**	0.709**

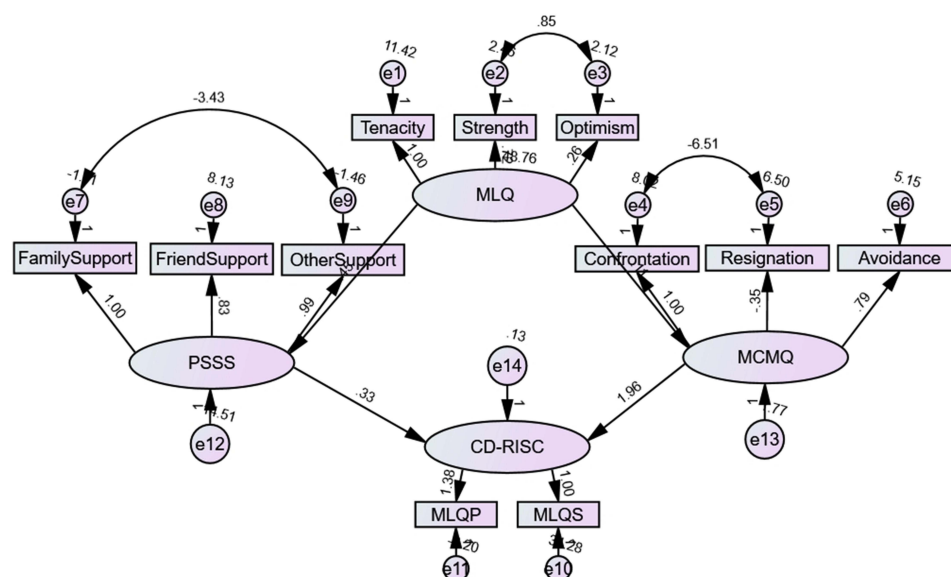
Note: \* $P < 0.05$ , \*\* $P < 0.001$ .

resilience and life meaning in COVID-19 patients, among which the mediating effect of Medical coping modes was 0.221, the mediating effect of perceived social support was 0.151, and the mediation effect equal to the total effect, which was 0.372.

## Discussion

### The Scores of COVID-19 Patients in MLQ, PSSS, MCMQ, and CD-RISC are Higher Than Moderate Level

The results of this study show that the total score of COVID-19 patients life meaning was  $54.14 \pm 11.46$ , which is higher than the scale median score 40 points, indicating that the surveyed patients awareness of life values and life goals were in the upper-middle level. This score is higher than the MLQ score ( $46.57 \pm 12.94$ ) obtained by Wang et al<sup>9</sup> on 119 patients with advanced



**Figure 2** The mediation model between MLQ, MCMQ, PSSS, CD-RISC in COVID-19 patients.



**Table 5** Bootstrap Interval of the Effector Values

Parameter	Estimate	Bias-Corrected			Percentile		
		Lower	Upper	P	Lower	Upper	P
IE1	0.221	0.043	0.484	0.017	0.040	0.480	0.019
IE2	0.151	0.018	0.389	0.014	0.013	0.358	0.021
IE	0.372	0.079	0.668	0.001	0.094	0.690	0.001
DE	0.000	0.000	0.000		0.000	0.000	
TE	0.372	0.079	0.668	0.001	0.094	0.690	0.001
Diff	0.071	-0.222	0.350	0.543	-0.204	0.364	0.497

cancer in Sichuan Province, and much higher than the statistics ( $28.95 \pm 6.02$ ) obtained by Guan et al<sup>10</sup> of 280 patients with cerebral hemorrhage in the recovery period. This may be primarily related to the respondent's different types of illnesses: In terms of the case-fatality rate, the mortality of advanced cancer and cerebral hemorrhage was higher than COVID-19, Although COVID-19 is a novel and highly infectious disease, patients still have an extremely high probability of survival as long as the correct epidemic prevention and efficient disease treatment are carried out. In terms of the disease treatment methods, radiation and chemotherapy methods are mainly adopted for advanced cancer patients. A craniotomy will be performed to remove the hematoma for brain blood patients. However, COVID-19 Patients generally use symptomatic supportive treatments such as respiratory support and circulatory support, compared with the treatment of the first two diseases, the pain of the latter will be slightly weaker and risky, and the side effects will also be smaller. If patients suffer too much treatment pressure and pain, they will gradually lose the motivation to pursue the value of life, what's worse, even produce extreme ideas. Therefore, the attention to patient's mental health cannot be ignored.

The total score of PSSS for patients with COVID-19 was  $70.00 \pm 14.14$ , which is at a relatively high level compared with the median score of 48 on the scale, indicating that the patient has received support from family, friends and others during the process of the disease, and the scores of the three are balanced. The score of this study is slightly higher than the COVID-19 patient's PSSS results ( $66.03 \pm 13.52$ ) of Li et al<sup>11</sup> using sampling in Heilongjiang Province.

The COVID-19 patient's MCMQ total score was  $47.86 \pm 3.29$ , of which the scores of confrontation and avoidance were higher than resignation. This was consistent with the findings of Chen et al<sup>12</sup> on AIDS patient's medical coping modes. And the scores of confrontation and avoidance were significantly higher than the domestic norm. He et al<sup>13</sup> also compared the MCMQ scores of AIDS patients with the domestic norm, the results showed that the avoidance score was also higher than the norm. It indicates that the patient is actively acquiring knowledge about the disease from professionals or other channels, and discussing the condition with relatives, friends or patients around him, but also eager to take other ways or means to distract their attention from the disease, which reflects the patient on the one hand want to urgently understand the information related to their own encounters to relieve stress, on the one hand, they want to take the mood of the distracting behavior in an acute stress state, so as to reduce the stress response, reduce physical and mental symptoms.

In the present study, the CD-RISC score of COVID-19 patients ( $71.92 \pm 14.64$ ) was far beyond the scale median score of 48 after deleting the "optimistic" item. And the scores of tenacity, optimism, and CD-RISC were significantly higher than the domestic average. It shows that patients with COVID-19 are highly resilient and have good psychological qualities. Most of them are able to face the disease, actively participate in treatment, as well as manage symptoms and emotions. Sun and Xiang<sup>14</sup> measured the COVID-19 patient's psychological resilience before and after psychological crisis intervention in Nanyang City. The total score of psychological resilience in this study was higher than before the intervention ( $54.01 \pm 11.52$ ) and lower than after the intervention ( $73.18 \pm 13.52$ ). Maybe the reason why the CD-RISC's score of this article was higher than before the intervention is that the provinces and cities differences in the epidemic situation and urban development: since the epidemic outbreak, the cumulative deaths in Hangzhou has been zero, while the mortality rate of COVID-19 in Nanyang City was 1.92%. The higher cure rate can give patients hope of regain health and treat the condition with a good attitude. In addition, compared with Nanyang, Hangzhou has more advanced economy and medical technology, whatever it



is hardware treatment equipment or software treatment level, both can make patients achieve better health status and quality of survival. The CD-RISC's score of this article was lower than after the intervention, indicating that there is still room for improvement in the patient's psychological resilience. The use of health education, psychological counseling and other psychological crisis interventions for the patients can help them resist and buffer the negative effects caused by stress, at the same time promote the psychological return to normal and realize self-growth.

## COVID-19 Patient's Gender and Treatment Place have Significant Differences in Life Meaning and Perceived Social Support Respectively

According to the research results, there were significant differences in COVID-19 patient's life meaning between different genders. Males were significantly higher than females, which is consistent with Zhou's<sup>15</sup> comparison of the gender differences in the life meaning of college students. The specific reasons are as follows: First of all, despite the current advocacy of gender equality, men are generally expected and held to higher standards than women in real life. To a certain extent, it makes male more likely to arouse fighting spirit when facing setbacks and constantly break themselves to discover the meaning of life. On the other hand, it may be related to the hormonal differences between men and women. Men with high testosterone levels are usually determined, while women with high estrogen believe in intuition and like to trust others. In addition, women often need to deal with the balance between family and career in life, so that they can suffer certain constraints in the process of pursuing meaning of life.

Treatment place also have significant impact on COVID-19 patient's perceived social support. According to the multiple comparisons results, in the three dimensions except for the "other" item, the score of outpatient and general ward patients were significantly higher than patients in the intensive care unit, but the difference between outpatient and general ward patients was non-significant. So, the more serious of the disease condition, the less support the patient perceives subjectively. Social support can be divided into objective social support and subjective social support. In the case of a patient with harmonious family and healthy interpersonal relationship, there will be more objective social support for patients in ICU than outpatient and general wards. Moreover, perceived social support is the individual experience of social support, pay more attention to emotional support and inner satisfaction. With the deterioration of disease condition, patients will not only suffer more pain, but also increase their inner fear anxiety and other emotions. They become more worried about spreading the virus to others, and the long-term isolation makes them even more afraid of being abandoned by the social and family. Therefore, it is more difficult for them to perceive the surrounding people's understanding of their own emotions subjectively.

## COVID-19 Patient's Life Meaning is Closely Positive Correlated to Perceived Social Support, Medical Coping Modes, and Psychological Resilience

The results of this study show that COVID-19 patient's life meaning had the highest correlation with perceived social support, with a value of 0.73. Xia and Dong<sup>16</sup> surveyed peritoneal dialysis patients also found that there is a significant positive correlation between the sense of life meaning and perceived social support. It indicates that the more an individual perceived social support and feels the positive power delivered to him by others, the easier it is to adopt a positive way to face adversity, and the sense of meaning of life will increase accordingly. The Pearson correlation coefficient between life meaning and medical coping modes in COVID-19 patients was 0.709, Positive coping style can help patients achieve good psychological adjustment in the process of fighting against the disease, with a more positive and optimistic attitude to face the disease and life. Compared with the former two, the correlation between COVID-19 patient's sense of life meaning and psychological resilience was smaller but still significant, which is consistent with the findings of Zhou and Wu.<sup>17</sup> When faced with stressful situations such as trauma and adversity, individuals with high psychological resilience can help themselves resist and buffer the negative effects of stress, promote their perception and understanding of life to be more positive and optimistic, and then reach a higher level of life meaning. While individuals with low mental flexibility are unable to better adjust their mental state, thus showing a lower level of meaning in life.<sup>18</sup>

## COVID-19 Patient's Perceived Social Support and Medical Coping Modes in the Mediating Effect Between Psychological Resilience and Meaning in Life

It can be seen from Figure 2 and Table 5 that the psychological resilience of patients with COVID-19 has a positive impact on medical coping modes ( $\beta=0.113$ ,  $P<0.05$ ) and perceived social support ( $\beta=0.452$ ,  $P<0.01$ ); perceived social support has a positive effect on the sense of meaning in life ( $\beta=0.334$ ,  $P=0.01$ ); medical coping modes have a positive effect on the life meaning ( $\beta=1.956$ ,  $P<0.05$ ); Psychological resilience indirectly affects the sense of meaning in life through medical coping modes and perceived social support respectively. This study found that the psychological resilience of COVID-19 patients was significantly positively correlated with the confrontation dimension in medical coping modes, which is consistent with Tang Wen's<sup>19</sup> analysis of patients with gastric cancer. When faced with adversity, optimistic patients often choose to adopt the positive coping style of confrontation and have high confidence in disease recovery. Psychological resilience is a protective factor of mental health, which can reduce the negative impact of stressors, so we suggest that clinical medical staff and patient's families should take corresponding measures to improve the psychological elasticity level as far as possible and promote the early improvement of the disease. Xie et al<sup>20</sup> pointed out that the psychological resilience of patients with hematopoietic stem cell transplantation has a positive predictive effect on the perceived social support ( $\beta=0.563$ ,  $P<0.01$ ). Through the survey of college students, Zhou and Wu<sup>17</sup> found that psychological resilience and perceived social support predict the sense of life meaning effectively, it confirms that perceived social support plays a certain intermediary role between psychological resilience and life meaning. The reason of this result may be that patients with higher psychological resilience level have more positive perception of social support, more willing to accept care from family, friends and colleagues, thereby comprehending more warmth and support, namely psychological resilience has a positive impact on perceived social support. These supports enable them to show higher vitality in thinking and positive attitude towards life, full of expectations for the future, and finally clarify the meaning of life, namely the positive effect of medical coping modes on life meaning.

## Conclusions

This study shows that COVID-19 patient's sense of life meaning was above the middle level, but there was still room for improvement. It clarified the influence path of COVID-19 patient's psychological resilience on their sense of life meaning, and verified the intermediary role of perceived social support and medical coping modes.

On the basis of mediation model result, the sense of life meaning can be improved by strengthening the perceived social support. The high level of perceived social support was conducive to the patient to think about life from a positive perspective. The more social support a patient get, the stronger their ability to overcome difficulties and setbacks, the easier to find the meaning of life. At the family level, the patient's families should give more care and encouragement to patients, communicate more with them and provide spiritual support to them, as well as treat recovered patients with an inclusive attitude. At the government level, our country has clarified the principle that COVID-19 patient's medical treatment should not be affected by the expenses, and covered the cost of medical treatment for patients. It shows the national responsibility of people-oriented and putting people's lives above everything else. Compared with countries that require self-financed treatment, patients in our country can feel the help and support of the government more effectively. Enterprises should give full play to their industrial advantages, and provide diversified assistance to COVID-19 patients, so that they can feel the warmth of the society and the meaning of life. At an institutional level: implement active labor market programs, sustained welfare, and targeted interventions for unemployed people.<sup>21</sup>

In addition, the life meaning can also be enhanced through the impact of psychological resilience on medical coping modes. Due to COVID-19 patients receive treatment in a strictly isolation environment, their body and mind are affected by many factors such as disease threats, information closure, unfamiliar environments and so on, lead to a severe psychological stress response. Therefore, care-givers can take some proper psychological interventions to patients, such as strengthen communication with patients, encourage patients to pour out their inner unhappiness and ideas, and enhance the psychological distance between patients; Positive information of social support for COVID-19 patients should be conveyed to patients, so that patients can eliminate the misunderstanding of stigma and social discrimination; Communicate the results achieved in the control of disease to patients and inform them that the condition is becoming

stable; Through the introduction of successful cases and other methods, positive energy of disease progress can be transmitted to patients to help them build confidence in treatment. During periods of confinement, remote supporting devices can be used to provide the patients with continued access to both primary and mental health care services.<sup>22</sup> These interventions have good effect on meeting the psychological needs of COVID-19 patients, alleviating anxiety and guiding them to adopt positive coping styles, thereby improving their sense of life meaning. Due to the limitation of time and region, the study sample is limited, and the factors affecting the COVID-19 patient's sense of life meaning maybe also cover other variables, which need to be further explored.

This research can be prospectively solved by the following limitations. First, the sample data of this study was obtained by filling in the questionnaire. In the design of the questionnaire, the four scales MLQ, CD-RISC, MCMQ, PSSS and the general information questionnaire were integrated into a questionnaire. Due to the large number of questions, respondents may be impatient to fill in the latter part, which requires the patient guidance of the investigators. In the future research, paid questionnaires can be adopted to encourage respondents to answer the questionnaire questions, so as to promote the smooth progress of the questionnaire survey. Secondly, the investigated subjects were patients with COVID-19 in Hangzhou, and the validity of the conclusions for other regions needs to be verified. Therefore, the application scope of the conclusions has certain limitations. Future studies can be extended by focusing on COVID-19 patients in different regions. Third, this study used a cross-sectional method to collect data, and the obtained data were the situation of the respondents at the same time, which can only reflect the characteristics of the respondents at a certain stage. In the future study design, cross-sectional research and longitudinal research can be combined, so as to understand the changes of individuals in different periods, and play a guiding role in improving the meaning of life.

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## Disclosure

The authors report no conflicts of interest in this work.

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