

# Associations of Psychological Capital, Coping Style and Emotional Intelligence with Self-Rated Health Status of College Students in China During COVID-19 Pandemic

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**Background:** COVID-19 lockdown can lead to mental health problem, and the problem is heterogeneous across individuals. In this study, we aimed to explore the association between the self-reported health status, emotional coping style, emotional intelligence and positive psychological state of college students during the COVID-19 pandemic in China.

**Methods:** The questionnaires of Self-rated Health Measurement Scale (SRHMS), Emotional Intelligence Scale (EIS), Psychological Capital Questionnaire (PCQ), Simplified Coping Style Questionnaire (SCSQ) were used for online survey. The study included 367 undergraduates.

**Results:** Undergraduate sex, sibling and birth of place were associated with either psychological capital scores or emotional intelligence. Online time per day had significantly negative associations with self-rated health and psychological capital scores. Multivariate analysis showed that the interaction between emotional intelligence, psychological capital and coping styles was statistically significant ( $\beta = -0.112$ ,  $p = 0.045$ ) in health status with psychological capital ranking the top ( $\beta = 0.428$ ). Mediation analysis showed that psychological capital and coping style modified the effect of emotional intelligence on health status.

**Conclusion:** Psychological capital and coping style modified the effect of emotional intelligence on health status in college students during the COVID-19 pandemic. In this pandemic emergency, a comprehensive intervention, such as positive coping styles with optimistic emotional perception and understanding as well as social support, is an important measure against the pandemic-induced mental health problem in college students in China.

**Keywords:** college students, coping style, emotional intelligence, health status, psychological capital

## Introduction

An outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes coronavirus disease 2019 (COVID-19), occurred in early January 2020 in Wuhan, China, resulting in the complete lockdown of Wuhan right before the eve of Chinese (or Lunar) New Year. To help slow the spread of highly contagious COVID-19, most of the cities in China later on took a series of prevention and control measures such as the restriction of traveling, party gathering and business operation, and social distancing, isolation and contact tracing. To meet the measurement for containing COVID-19, the Ministry of Education of China made a decision, closing all schools for the spring semester until reopen. Consequently, all students were not allowed to return to campuses for in-person class, instead stay at home and opt for virtual online courses. Such physical isolation made individuals fewer opportunities to engage with peers. In addition, the communications with others via internet increased the probability of excessive online surfing, exposing individuals to a large number of complex information streams. Therefore, the long-term isolation and lockdown or closures and stressful information on COVID-19 could result in anxiety, fear, grief and other emotional problems,

consequently affecting physical, social and mental health issues.<sup>1</sup> Mental health issues, such as difficulty in sleeping or eating, abuse alcohol consumption or substance, worsening chronic conditions, increased due to worry and stress over the pandemic.<sup>2-5</sup> To alleviate this potential health problem, mental health experts provided a series of shareable resources on how to cope with COVID-19 and how to manage stress during this difficult time, educating individuals how to stabilize emotions with a positive attitude to fight against COVID-19-related stress. Although college students are young with relatively less susceptible to severe COVID-19 in comparison to the elderly (older than 65 years), campus closure, physical isolation (or home-confinement) and online instruction still brought negative impacts on their mental health.<sup>6</sup> A recent study consisting a small sample size conducted in Poland reported that the COVID-19 outbreak led to high stress and low general self-rated health in university students.<sup>7</sup> As a special population, college students' health always can affect their parents' and the community's health and emotional distress. Thus, it is essential to evaluate college students' health and assess factors influencing mental health in the context of the COVID-19 pandemic, so that strategies could be made to improve their health and achievements.

Emotional intelligence refers to the ability of an individual to properly perceive and understand emotions, regulates emotions through certain strategies, and uses emotional knowledge to deal with difficulties.<sup>8</sup> In stressful situations, individuals with high emotional intelligence generally can interact with others in a receptive and appropriate way, thereby optimally adapting themselves to surrounding environments with motivation, perseverance, empathy and mental agility.<sup>9</sup> In contrast, those with low emotional intelligence are vulnerable to stress and burnout.<sup>10</sup> During the pandemic, nurses with high emotional intelligence have been shown to have better job performance in a study conducted in Saudi Arabia.<sup>11</sup> Emotional intelligence could reduce the anxiety in international students studying in China during the pandemic.<sup>12</sup> Wang et al reported that professional students who had a high level of emotional intelligence could keep mental health better during the pandemic.<sup>13</sup>

Psychological capital refers to a set of resources an individual can use to help improve their performance on the job and their success. It consists of four aspects: self-efficacy (confidence), optimism, hope and resilience. It has been shown that psychological capital could ameliorate the negative consequences of stress on mental health, and enhance positive psychological outcome in undergraduate students.<sup>14</sup> High psychological capital empowers individuals with resilience strength to cope up with adverse situations. The results from another study also suggest that increasing psychological capital has a protective effect on the risk of burnout and traumatic stress in social workers, augmenting the sustainability of their working conditions.<sup>15</sup> Similar results were reported in a previous study on Chinese nurses, showing that psychological capital reduced job burnout with the help from organizational commitment.<sup>16</sup> Psychological resilience, an ability to "bounce back" from a negative emotional experience and to confront stressful situations, is a major protective factor of burnout in nurses.<sup>17,18</sup> Moreover, a recent study reported that psychological support was positively associated with better mental health,<sup>19</sup> which might alleviate psychological impact in university students of Bangladesh during COVID-19 pandemic.<sup>20</sup> Mediating analyses showed that psychological capital had direct and indirect effect on mental health via social capital during COVID-19 pandemic.<sup>21</sup>

When individuals confront stress or difficulties, different persons may take different coping strategies of either task-, emotion- and avoidance-oriented coping. Previous studies have shown that a lower burnout is accompanied with task-oriented coping, whereas an increased burnout results from emotion-oriented coping, and the long-term avoidance-oriented coping can lead to severe mental problem.<sup>22-25</sup> Over the period COVID-19 pandemic, individuals with poor coping styles had adverse mental health of anxiety and depression.<sup>26,27</sup> However, the anxiety and depression could be substantially alleviated if an individual had a plenty of resources (psychological capital) to use, which could make the one to take an appropriate coping strategy.<sup>28</sup> Moreover, individuals with a strong emotional intelligence have an ability to restrain negative emotions, low self-esteem and anxiety, and they can courageously face the challenge of stress-related issues.<sup>29</sup> Previous studies also showed that sex, marital status, and birthplace were also associated with job-related stress and burnout in nurses.<sup>30,31</sup> Female students were more anxious and stressed than males during COVID-19 pandemic in Bangladesh.<sup>20</sup>

Taken together, we hypothesize that emotional intelligence, psychological capital and coping style are associated with self-rated health of college students during the COVID-19 pandemic in China. Thus, the purposes of this study were to investigate the associations among emotional intelligence, psychological capital, coping style and health status in college

students during the COVID-19 by conducting a cross-sectional survey in Henan, China, so that we can provide theoretical basis to make strategies to keep students healthy in the context of COVID-19.

## Participants and Methods

### Study Subjects

In May 2020, we conducted a survey on the impact of COVID-19 pandemic on health status in college students in China using online questionnaires via the platform of “Questionnaire Star”. There are 25 universities in Zhengzhou, and one college was chosen by randomly sampling based on the first letter of the sorted school names, each of the schools was assigned a number for selection. The study team first contacted the class teacher for explanation of the study project. Then, through WeChat class group for each class, the questionnaire was delivered to each student in the group with the instruction. A total number of 367 undergraduate students voluntarily participated and provided valid questionnaires. Among the participants, 88 (24.0%) were men, and 279 (76%) women. The age ranged from 18 to 24 years, with an average age of 20 years. The basic demographics and questions include such as sex, age, birthplace, and time length spent on internet surf per day. Informed consent was obtained from all participants included in the study.

### Health Status

Using the self-rated health measurement scale in Chinese version<sup>32</sup> (self-rated health measurement scale, SRHMS), the health status of each participant was evaluated. The measurement scale includes 48 items in three dimensions: physical, mental, and social health. Using 0–10 scoring method for each item, the scores of each dimension are the sum of all items in the dimension. The higher the score is, the better the health status. The Cronbach’s  $\alpha$  coefficient of the scale in this study was 0.939.

### Emotional Intelligence

The Emotional Intelligence Scale (EIS), which was developed by Wong and Law,<sup>33</sup> has 16 items in 4 measure dimensions of emotional awareness and management of one’s own and others: self-emotional evaluation, emotional evaluation of others, emotional use and management. Using the 5-point rating method for each item, 1 represents “strongly disagree”, and 5 for “strongly agree”. The higher the score of the subject is, the higher the level of emotional intelligence is, and the higher ability to regulate one’s own emotions is when necessary and help others to do the same. In this study, the Cronbach’s  $\alpha$  coefficient of the scale was 0.890.

### Psychological Capital

The psychological capital questionnaire (PCQ) developed by Luthans et al was used to comprehensively evaluate psychological capital. The Chinese version of PCQ was translated by Li et al.<sup>34</sup> The questionnaire contains 24 items in four measure dimensions: self-efficacy, hope, resilience and optimism. Each item uses Likert 6-level scoring method, 1 means “strongly disagree” and 6 for “strongly agree”. The higher the score is, the higher the level of positive psychology for individuals, and the more resources they can use to improve their performance on the job and their success. The Cronbach’s  $\alpha$  coefficient of the scale in this study was 0.958.

### Coping Style

The Simplified Coping Style Questionnaire (SCSQ) was used to measure the coping style of college students.<sup>35</sup> There are 20 items in two dimensions of positive and negative coping. The score each item is graded 0 to 3. A high score of the positive coping indicates that the individuals are more inclined to adopt positive coping styles with efforts to solve a stressful situation/problem, and a high score of the negative coping refers that the individuals are more inclined to adopt negative coping styles with distancing or avoiding a stressful situation. The sum score of coping style is equal to the positive coping score minus the negative coping score. The Cronbach’s  $\alpha$  coefficient of the positive coping and negative coping in this study was 0.863 and 0.741, respectively.

## Statistical Analysis

All data analyses were performed using SPSS 18.0 software. The measurement data showed an approximate normal distribution using the normality test with both skew and kurtosis methods. Online surfing time was grouped based on the cutoff of 3 and 6 h as previously described elsewhere.<sup>36</sup> Pearson correlation analysis was performed to examine the correlation between self-rated health, emotional intelligence, psychological capital, and coping style. ANOVA test was used to compare the difference in numerical variables with Bonferroni correction for multiple comparisons. Multivariate regression analysis was used to explore the effect of emotional intelligence, psychological capital, and coping style on and their interaction in self-rated health.<sup>37</sup> The PROCESS plugin for SPSS was used to assess the strength of the indirect effects in mediation analyses.<sup>38</sup> In PROCESS, total, direct and indirect effects were calculated and tested for significance.<sup>39-41</sup> The mean value for the ab ( $a \times b$ ) product across the bootstrapped samples provided a point estimate of the indirect effect and 95% confidence intervals (CI). Each analysis was based on 5000 bootstrapped samples, as suggested by Preacher.<sup>40</sup> A p value less than 0.05 was considered statistically significant.

## Results

### Common-Method Variance (CMV) Test

The Harman's single-factor test was used to measure the common-method variance. The result showed no severe common-method variance existing in this study. Twenty-two factors had eigenvalues greater than 1, and 27.67% of the variance was explained by the first factor, which is less than the criterion of 40%.<sup>42</sup>

### Characteristics of Self-Rated Health, Emotional Intelligence, Psychological Capital and Coping Style in College Students During COVID-19 Pandemic

Table 1 illustrates the associations of self-rated health, emotional intelligence, psychological capital and coping style scores with demographic variables in college students of a university in China during the COVID-19 pandemic period. Male students had a significantly higher score of psychological capital than female ( $p < 0.05$ ). The students who have no

**Table 1** Associations of Self-Rated Health, Emotional Intelligence, Psychological Capital and Coping Style with Demographic Variables in College Students (Mean  $\pm$  SD)

Variable	N	Self-Rated Health	Emotional Intelligence	Psychological Capital	Coping Style
Sex					
Male	88	335.31 $\pm$ 50.54	46.05 $\pm$ 6.09	107.24 $\pm$ 16.86	0.77 $\pm$ 0.64
Female	279	335.76 $\pm$ 42.65	44.91 $\pm$ 4.77	102.72 $\pm$ 15.99	0.83 $\pm$ 0.61
t		-0.076	1.816	2.283*	-0.824
Having Siblings					
No	61	342.56 $\pm$ 44.09	46.70 $\pm$ 5.18	109.21 $\pm$ 16.13	0.90 $\pm$ 0.69
Yes	306	334.27 $\pm$ 44.64	44.88 $\pm$ 5.08	102.72 $\pm$ 16.14	0.80 $\pm$ 0.60
t		1.326	2.558*	2.869**	1.226
Birthplace					
Urban	104	338.42 $\pm$ 45.90	46.39 $\pm$ 4.69	106.38 $\pm$ 16.08	0.81 $\pm$ 0.63
Suburban	41	342.34 $\pm$ 43.23	45.02 $\pm$ 5.94	104.44 $\pm$ 16.59	1.00 $\pm$ 0.65
Rural	222	333.12 $\pm$ 44.60	44.64 $\pm$ 5.09	102.47 $\pm$ 16.25	0.78 $\pm$ 0.61
F		1.021	4.216*	2.089	2.19
Online surfing time					
<3h	88	342.00 $\pm$ 43.59	45.72 $\pm$ 5.28	107.90 $\pm$ 16.44	0.89 $\pm$ 0.65
3-6 h	178	338.27 $\pm$ 42.50	45.35 $\pm$ 5.15	104.53 $\pm$ 14.83	0.82 $\pm$ 0.59
>6 h	101	325.50 $\pm$ 47.72	44.43 $\pm$ 4.92	98.95 $\pm$ 17.53	0.74 $\pm$ 0.65
F		3.872*	1.67	7.708**	1.237

Note: \* $P < 0.05$ , \*\* $P < 0.01$ .

siblings had a significantly higher score of both emotional intelligence and psychological capital than those having siblings ( $p < 0.05$ ). There were significant differences in emotional intelligence scores between the students from different areas ( $p < 0.05$ ). Pairwise comparisons showed that the students from urban areas had a significantly higher emotional intelligence score than those from rural areas ( $p < 0.05$ ). Significant differences were also observed in self-rated health status, and psychological capital scores between students who spent different hours per day in internet surfing ( $p < 0.05$ ). With online surfing hours per day increasing, the scores of self-rated health and psychological capital significantly decreased. Students who spent less than 3 h online surfing per day had significantly better health status or higher psychological capital scores than those who spent more than 6 h ( $p < 0.05$ ).

## Correlations Between Health Status, Emotional Intelligence, Psychological Capital and Coping Style Scores in College Students

The results of Pearson correlation analyses are shown in Table 2. There were significantly positive correlations between self-rated health, emotional intelligence, psychological capital and coping style scores in college students during the COVID-19 pandemic ( $p < 0.01$ ). A moderate correlation strength was observed between either emotional intelligence, or psychological capital or coping style, or self-rated health, as well as between emotional intelligence and psychological capital (correlation coefficients ranged from 0.50 to 0.65). A relatively weak positive correlation existed between coping style score and either emotional intelligence or psychological capital (correlation coefficients 0.35 and 0.42).

## Association of Self-Rated Health with Emotional Intelligence, Psychological Capital and Coping Style

To investigate the effect of emotional intelligence, psychological capital and coping style on and their interactions in self-rated health in college students during the period of COVID-19 pandemic, we performed multivariate regression analyses by constructing three different models. The results are illustrated in Table 3. All the tolerances were greater than 0.1 and VIF  $< 10$ , so there is no collinearity of the variable. In model 1, we included the main effects of three variables with sex and having siblings as covariates only. We found that the main effects explained 47.5% variation of self-rated health. The emotional intelligence, psychological capital and coping style had significantly positive effects, whereas sex and siblings were not statistically significant. The coefficient of psychological capital was the largest, suggesting that psychological capital was the largest contributor to self-rated health in the model. In model 2, then we added pairwise interaction terms of emotional intelligence, psychological capital and coping style besides the main effects. No pairwise interaction was found statistically significant. We then added a three-way interaction term beyond model 2 in model 3, and we found the three-way interaction term was statistically significant ( $p = 0.045$ ). The three-way interaction independently explained 0.6% variation of self-rated health.

To further investigate the mediating effect of psychological capital and coping style on emotional intelligence and self-rated health, we performed mediation analysis using the Bootstrap method. The results are shown in Table 4. We found that the indirect effects from both psychological capital and coping style were statistically significant. The contribution of psychological capital accounted for 58.8% and coping style for 26.1%.

To visualize the effect of emotional intelligence, psychological capital and coping style and its interaction in self-rated health in college students during the period of COVID-19, we further constructed a figure showing the relationship between three variables and self-rated health based on the method for a three-way interaction as described by Dawson

**Table 2** Pearson Correlations Between Health Status, Emotional Intelligence, Psychological Capital and Coping Style in College Students (N = 367)

Variable	Mean	SD	Self-Rated Health	Emotional Intelligence	Psychological Capital	Coping Style
Self-rated health	335.65	44.60				
Emotional intelligence	45.18	5.13	0.50**			
Psychological capital	103.80	16.29	0.63**	0.65**		
Coping style	0.82	0.62	0.50**	0.35**	0.42**	

Note: \*\* $p < 0.01$ .

**Table 3** Effect of Emotional Intelligence, Psychological Capital and Coping Style on Self-Rated Health in College Students

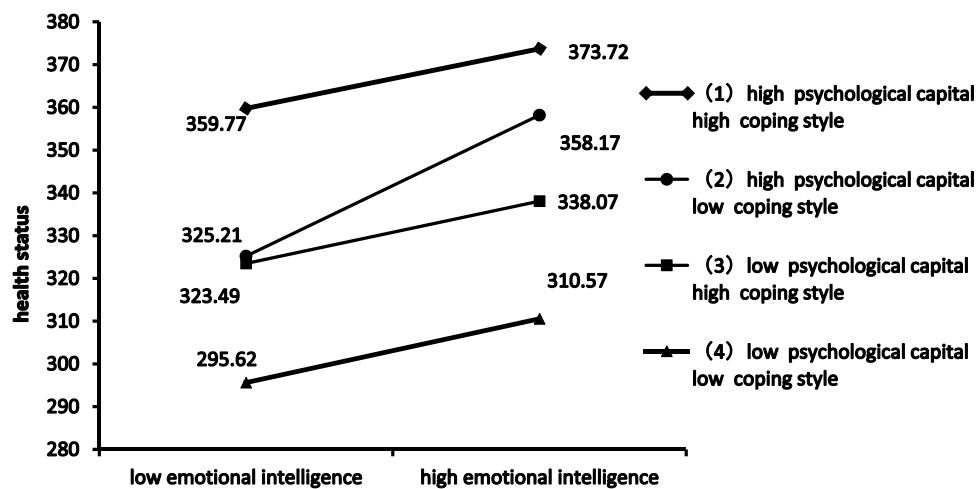
Variable	$\beta$	p value	Tolerance	VIF
<b>Model 1</b>				
Sex	0.056	0.146	0.961	1.040
Having siblings	0.024	0.527	0.964	1.037
Emotional intelligence	0.170	0.001	0.546	1.830
Psychological capital	0.419	<0.001	0.524	1.909
Coping style	0.250	<0.001	0.767	1.304
Adjusted $R^2$	0.475			
<b>Model 2</b>				
Sex	0.053	0.176	0.936	1.069
Having siblings	0.024	0.532	0.959	1.043
Emotional intelligence	0.171	0.001	0.543	1.841
Psychological capital	0.415	<0.001	0.501	1.995
Coping style	0.253	<0.001	0.744	1.345
Emotional intelligence $\times$ psychological capital	0.053	0.335	0.473	2.114
Emotional intelligence $\times$ coping style	-0.071	0.283	0.334	2.993
Psychological capital $\times$ coping style	-0.015	0.799	0.404	2.476
Adjusted $R^2$	0.474			
$\Delta R^2$	0.003	0.517		
<b>Model 3</b>				
Sex	0.051	0.194	0.935	1.070
Having siblings	0.028	0.476	0.957	1.045
Emotional intelligence	0.218	<0.001	0.450	2.224
Psychological capital	0.428	<0.001	0.495	2.022
Coping style	0.289	<0.001	0.636	1.573
Emotional intelligence $\times$ psychological capital	0.068	0.217	0.464	2.154
Emotional intelligence $\times$ coping style	-0.061	0.354	0.332	3.009
Psychological capital $\times$ coping style	-0.018	0.757	0.404	2.478
Emotional intelligence $\times$ psychological capital $\times$ coping style	-0.112	0.045	0.457	2.186
Adjusted $R^2$	0.478			
$\Delta R^2$	0.006	0.045		

**Table 4** Mediating Effect of Psychological Capital and Coping Style on Emotional Intelligence and Self-Rated Health

Mediating Variable	Emotional Intelligence (a)	Self-Rated Health (b)	Total Effect (c)	Direct Effect (c')	Indirect Effect (ab) (95% CI)	Percentage (ab/c) %
Psychological capital	2.05***	1.36***	4.74***	1.95***	2.79 (2.10,3.51)	58.8
Coping style	0.05***	24.41***	4.74***	3.50***	1.24 (0.86,1.66)	26.1

**Notes:** \*\*\* $P < 0.001$ ; a, the effect of the independent variable on mediating variable; b, the effect of mediating variable on self-rated health; c, the total effect of the independent variable on self-rated health; c', the direct effect of the independent variable on self-rated health after the introduction of mediating variable; a  $\times$  b, the mediating effect of mediating variable between emotional intelligence and self-rated health.

and Richter<sup>37</sup> (Figure 1). With the increased emotional intelligence, the self-rated health score increased regardless of psychological capital and coping style. At the same level of emotional intelligence, the self-rated health status was better in college students with high vs low psychological capital. At the same levels of emotional intelligence and psychological capital, the self-rated health score was better in college students who actively took positive vs negative coping styles. Overall, individuals with high psychological capital and coping style show the best health status regardless of emotional intelligence. High emotional intelligence improves health status in comparison to low one at the same level of psychological capital and coping style.



**Figure 1** Interaction of emotional intelligence, psychological capital and coping style in self-rated health. Blue line represents the individuals with high psychological capital and coping style; grey line represents those with high psychological capital but low coping style; tangerine line represents low psychological capital but high coping style; and orange line represents low psychological capital and coping style.

## Discussion

In this study, we demonstrated the associations between emotional intelligence, psychological capital, coping style and self-rated health in college students in China during the period of COVID-19 pandemic. We found all three variables were significantly positively associated with self-rated health, and there was a statistically significant three-way interaction. We also found that almost 60% of total effect of emotional intelligence on health status could be explained by psychological capital, whereas coping style accounted for 26.1%. The results suggest that college students who had high emotional intelligence, psychological capital and coping style scores had better health conditions than their peers with low ones. Particularly, psychological capital provided more resources to help students to overcome the stress challenge. We also found that psychological capital and coping style modified the effect of emotional intelligence on health status. This result extends the previous findings reported by another study recently conducted in China, in which social capital mediated the effect of psychological capital on mental health in Chinese residents during COVID-19 pandemic.<sup>21</sup> To our knowledge, this is the first study to investigate the effect of emotional intelligence, psychological capital and coping style, and their interaction on college student health during the pandemic.

Emotional intelligence is an important determinant in an individual's life success, and affects a person's mental health and social status. The stronger the individual's ability to regulate emotion is, the more helpful it is for the person to relieve stress and stabilize his/her emotional state.<sup>43</sup> A recent study demonstrated that the emotional intelligence workshops and seminars could improve academic engagement and performance, and reduce academic burnout in pharmacy students during the lockdown and quarantine.<sup>44</sup> Individuals with a positive psychological capital score showed a more determined attitude in the face of difficulties,<sup>45</sup> and believed that they had abilities and more resources to use to overcome difficulties and achieve success when facing the challenges. Lebares et al reported that a high psychological resilience was significantly positively associated with a low risk of emotional exhaustion-related burnout and low job performance.<sup>46</sup> Similarly, Hafsa et al also observed a positive correlation between emotional intelligence and loneliness in adolescents.<sup>47</sup> High emotional intelligence could significantly alleviate the anxiety, maintaining mental health for students during the pandemic.<sup>12,13</sup> Moreover, it has been shown that psychological support might mitigate the effect of COVID-19-caused stress in university students in Bangladesh during COVID-19 pandemic<sup>20</sup> and that individuals with more psychological support had better mental health status.<sup>19</sup> In consistence with this principle, our study showed that at the same level of emotional intelligence, college students with a high psychological capital score had better self-rated health state than those with a low one.

Coping style refers to the cognitive and behavioral styles that individuals take to deal with the frustrations and difficulties when they face in daily life. The choice of coping styles, task-oriented, emotion-oriented and avoidance-oriented, determines

the consequent effect of stress events on individuals' health.<sup>48</sup> Individuals taking task-oriented coping will actively find a solution to solve the stress problems by such as learning new skills or obtaining more information to manage and consequently eliminate it. Emotion-oriented coping involves an emotional response to the perception of stress, alleviating the stressor-associated unpleasant stressful feelings. Avoidance-oriented coping instead involves activities and cognition to avoid the stressful situations, always accompanying with distraction and social diversion. Repeated or long-term avoidance or distancing from a stressful situation can result in a detrimental consequence to mental health. Individuals with a positive coping style usually actively try to find a problem solution (active coping), face the challenge, and seek social support with optimistic attitude. A previous study demonstrated that the positive coping styles could promote individual's mental health with a positive attitude, and reduce psychological harm.<sup>49</sup> For example, a negative correlation was found between positive coping style and psychological stress in infertile women.<sup>50</sup> A similar finding was found in patients with either breast cancer or osteoarthritis, the coping style affected the mental health.<sup>51,52</sup> Another study showed that undergraduate nursing students with higher personal resilience (positive coping style) had a lower stress during COVID-19 pandemic in India.<sup>53</sup> Similarly, students who had an emotion-focused coping style had a higher level of anxiety during the COVID-19 pandemic in Poland.<sup>54</sup> A two-phase longitudinal study showed that during the COVID-19 pandemic, Chinese children with active-avoidance coping style had a low level of anxiety and depression.<sup>55</sup> Negative coping style associated with psychological distress in Chinese college students.<sup>56</sup> A recent study conducted in a large university of the Mid-Atlantic region in the United States showed that extraversion and avoidance coping style moderated the effect of COVID-19 stressful life events on mental health.<sup>57</sup> Moreover, a positive correlation was observed between positive coping style and less psychological distress in Indian population during lockdown.<sup>58</sup> Furthermore, when an individual has more psychological capitals during the grow-up, it is easier for him/her to take a positive coping style to find solutions with more positive optimism when facing challenges,<sup>59</sup> promoting the individual's health. In this study, we found that the psychological capital was a major effect on self-rated health with a statistically significant three-way interaction analysis. Seeking social support and taking a positive coping style are important in maintaining a good health status when they face a stressful situation, and it is a more active strategy even at the same level of emotional intelligence.

In this study, we also found that sex, having sibling or not, birthplace and online surfing time were associated with emotional intelligence, psychological capital and coping style. Previous studies have shown that women had a higher emotional intelligence than men in the nursing profession.<sup>60,61</sup> However, we did not find a significant difference in emotional intelligence in college students. This discrepancy is most likely due to the difference in social experience. Undergraduate Students, particularly in China, have much less experience in society in comparison to nurses or other professionals. Male college students have a relatively more social relation, and more resources to use. Thus, when they face challenges and difficulties, generally, they are more active with courage and optimism to solve the problems in comparison to their female peers. College students from only-one child family (no siblings) usually had a higher emotional intelligence and psychological capital score, since they probably started earlier to play together with peers from other families, learning mutual and social relationships through the interaction. Similarly, the students from urban area usually had more skills to identify and manage their own emotions and might affect others as necessary, since their family incomes were relatively higher with more opportunities to expose themselves to different cultures in urban than in rural area. In addition, although the internet emergency facilitates the access to obtain knowledge and information, the internet also provides a virtual village for users, allowing online interactions behind screen but with isolating themselves from others. It has been reported that dissociation positively associated with depression in married women.<sup>62</sup> Internet addiction made college students insufficient personal communication with peers, thereby leading to mental health problem.<sup>56</sup> Interestingly, the significance of sex and siblings in the univariate analyses disappeared in the multivariate analyses, suggesting that the associations of sex and siblings with mental health are dependent.

There was a significantly positive correlation among the variables of college students' emotional intelligence, psychological capital, and coping styles as expected. The findings suggest that college students with a high emotional intelligence have more resources and adopt a positive coping style, since they have a strong ability to perceive, evaluate, understand, express their own emotions and influence others'.<sup>63</sup> When they had more psychological capitals to



use, they took more positive coping styles with optimism to face difficulties.<sup>64</sup> Thus, a better health status was maintained.

Some limitations exist in this study. This survey is a cross-sectional study, and it is difficult to make causal inference from the association between the factors we investigated and self-rated health. Secondly, the sample size is relatively small, and the survey was conducted in one college only, bias may exist and the participants may not well represent the whole population of college students. However, the findings warrant further studies with a relatively large sample size. Longitudinal or intervention studies can be carried out.

## Conclusion

In summary, this study demonstrated the associations of emotional intelligence, psychological capital and coping style with health status in college students in China during the period of COVID-19 pandemic. We found that interaction existed between psychological capital, coping style and emotional intelligence in college students' health with the psychological capital and coping style modifying the effect of emotional intelligence on health status in college students regardless of sex and whether they had siblings or not under the pandemic stress. The findings provide knowledge for our educational administrators how to improve and maintain college students' health, keeping them mentally healthy during the period of COVID-19 pandemic. A comprehensive intervention measure targeting emotional intelligence, coping style and psychological capital (eg, social support) is warranted.

## Data Sharing Statement

The dataset supporting the conclusions of this article can be shared with the corresponding author by email.

## Ethics Approval and Consent to Participate

The Ethical Committee of Zhengzhou Normal University approved the study's protocol (No: ZZNU-2020-006). The questionnaire had an introductory paragraph explaining the purpose of the survey and the name of the research center undertaking the research, and that responses were anonymous. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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## Disclosure

The authors report no conflicts of interest in this work.

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