

## RESEARCH ARTICLE

# Chinese adolescents' mental health status and their coping strategy use in COVID-19

Wenjie Lai<sup>1</sup>, Bo Han<sup>2</sup>, Kai Zhang<sup>3</sup>, Weiwei Zhang<sup>1,\*</sup>

<sup>1</sup> College of Foreign Languages and International Education, Quzhou University, Quzhou 324000, China

<sup>2</sup> School of Humanities, Southeast University, Nanjing 211189, China

<sup>3</sup> College of Education, Huaibei Normal University, Huaibei 235000, China

\* Corresponding author: Weiwei Zhang, weiwei.zhang@qzc.edu.cn

## ABSTRACT

This study investigated the relationships between Chinese adolescents' mental health status and their coping strategy use in the context of the Coronavirus Disease 2019 (COVID-19). A total of 4579 participants answered two questionnaires, and data were analyzed through multiple statistical procedures, including Pearson correlation test and one-way ANOVA. The findings show that COVID-19 generally had minor effects on the mental health of the participants and problem-solving was reported as an effective strategy to tackle the stressors caused by the pandemic. Additionally, avoiding, help-seeking and patience demonstrated similar frequency across participants and fantasizing was used the most by those with severe mental health status. These findings will shed some light into how educators provide effective mental health instructions for students, and concomitantly will help in tailoring early interventions that would mitigate the adverse effects of disasters like COVID-19 on adolescents and beyond.

**Keywords:** Chinese adolescents; mental health; coping strategies, COVID-19

## 1. Introduction

The motivation of this study relates to one of the authors' works as a professional engaged in Chinese adolescents' education. In China, the number of adolescents (Grade 7–12 students) has reached to approximately 150 million as of 2020, accounting for almost 11% of the total population in this country<sup>[1,2]</sup>. Compared with other groups, adolescents have always been the focus in humans, as adolescence is a formative phase of life, and it lays a solid foundation for individuals' later life and for the next generation<sup>[3]</sup>. Poor mental health in adolescence will compromise individuals' development and future potentials<sup>[4,5]</sup>. In psychology, adolescents are considered as vulnerable to disasters and are prone to mental health problems impacted by such events<sup>[4,6]</sup>. The COVID-19 pandemic could be taken as such a disaster. During the past years, the original studies from in different countries<sup>[1,7,8]</sup> have highlighted the negative impact of the pandemic on adolescents' mental health. For instance, depression and anxiety were reported to be higher among children and adolescents in many countries<sup>[9]</sup>, who may still suffer from long-term adverse consequences even after the pandemic<sup>[10]</sup>; individual differences such as age, gender, and knowledge about COVID-19 significantly influenced adolescents' psychological status<sup>[11]</sup>. Other research reported that Canadian adolescents also suffered from

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loneliness and pressure due to lacking of companionship of their peers<sup>[12]</sup>.

Despite the negative impact of the COVID-19 on adolescents' mental health, it is proposed that such an impact can be moderated by the use of coping strategies<sup>[13,14]</sup>, and adolescents who use positive coping styles tend to have good mental health<sup>[15,16]</sup>, while negative coping styles are strong predictors of poor mental health among youth<sup>[17,18]</sup>. The importance of coping strategies for adolescents in mentally dealing with times of crisis or disasters, in conjunction with the salience of adolescents' mental health in humans and the huge population of this group in China, explains the ever-increasing research interest among scholars, especially Chinese scholars, in adolescents' mental health status<sup>[1,4]</sup> and their coping strategies<sup>[13]</sup> against the backdrop of the COVID-19.

Regardless, the extant literature has revealed that these scholars have primarily focused on either adolescents' mental health or their use of coping strategies in the pandemic, and hence little is known about the relationships between the two variables. Consequently, what coping strategies are effective in assisting adolescents to tackle certain mental problems they may suffer from during crisis or disasters such as COVID-19 still remains unclear. Given that a global situation like the pandemic could be prolonged and repeated<sup>[4]</sup>, an examination of such relationships is warranted, which also formulated the research purpose of the current study. Through the examination, this study is hoped to provide some empirical evidence regarding effective coping strategies that can empower adolescents to reduce risks for mental health problems caused by COVID-19. This will further provide some insights into classroom instructions through which educators can teach students appropriate coping strategies to tackle possible mental problems in crisis or disasters<sup>[9]</sup>. Concomitantly, the study will help in tailoring early interventions that would mitigate the adverse effects of disasters like the pandemic on adolescents and beyond<sup>[19]</sup>.

## **2. Literature review**

Mental health is acknowledged as the most critical condition for a life with good quality, and it refers to individuals' well-being in which they can cope with stress of life<sup>[5,20]</sup>. The more recent definition proposed by Galderisi et al.<sup>[20]</sup> regards mental health as one's flexibility and ability to cope with adverse events. The available literature that targets adolescents' mental health status during COVID-19 has shown that due to home confinement and school closure caused by the pandemic, adolescents were subject to various forms of mental health problems. Examples of such include Guessoum et al.<sup>[4]</sup>, Orgilés et al.<sup>[9]</sup> and Ravens-Sieberer et al.<sup>[6]</sup> whose studies show that adolescents suffered from varying levels of anxiety and depression symptoms. In terms of Chinese adolescents, similar symptoms were reported in studies conducted by Chinese scholars such as Duan et al<sup>[1]</sup>, to name a few. Further, inattention, irritability, uncertainty, and a sense of fear and isolation were also reported<sup>[6,21]</sup>. These mental health problems have exerted a negative and tremendous impact on the quality of adolescents' daily life and academic performance<sup>[3,9]</sup>.

To avoid or weaken such an impact which may persist even in one's adulthood<sup>[22]</sup>, relevant literature suggests that adolescents need to respond appropriately to cope with these stressors<sup>[23]</sup>. Individuals' coping refers to their conscious efforts (e.g., regulating one's behaviors and the environment) in response to stressful circumstances<sup>[24]</sup>. Although inconsistency still exists regarding the conceptualization of this construct<sup>[24]</sup>, in general, coping can be categorized into adaptive and maladaptive coping strategies<sup>[19,25]</sup>. Coping strategies are also termed coping styles, coping behaviors and coping skills<sup>[9,26]</sup>, and so in this study we used these terms interchangeably.

Adaptive coping strategies are typically invoked when individuals take active actions such as problem-solving and seeking support to manage crises, viewing themselves as in a control and positive position to tackle life stressors. In contrast, maladaptive coping strategies are characterized by emotion-focused tactics, and are

commonly adopted by those who tend to feel that they cannot manage stressful situations and therefore they must endure by taking actions such as self-blame, avoidance, or even drug or alcohol abuse<sup>[25]</sup>. Regarding the specific context related to Chinese adolescents, almost two decades ago, Chinese psychologists<sup>[27]</sup> proposed that the coping strategies through which Chinese adolescents handle stressful life can be categorized as positive ones, including problem-solving and help-seeking and negative ones covering patience, venting, avoiding and fantasizing. These strategies are generally consistent with the latest empirical studies into adolescents' coping strategy use during COVID-19. For instance, seeking support, problem-solving, and collaborative interaction were found by Donker et al.<sup>[28]</sup>, Orgilés et al.<sup>[9]</sup> and Qi et al.<sup>[13]</sup>, while self-blame, venting, and avoidance were reported in studies such as Yang<sup>[24]</sup> and Ye et al.<sup>[19]</sup>.

Essentially, with reference to the definition of mental health as stated above, adolescents' use of coping strategies during the COVID-19 reflect their mental health. Further, as many scholars<sup>[19,22]</sup> have pointed out, if adolescents repeatedly employ maladaptive coping strategies in stressful circumstances, psycho-pathological symptoms may occur in these young people. In the contrary, adaptive coping strategies operate to protect adolescents from the adverse effects of life stressors, helping them reduce the likelihood of occurrence of mental health problems and integrate stressful experience with their existing cognitive schemas about themselves and the world for better psychological adjustment. This indicates the close relationship between adolescents' mental health and their coping strategy use. Moreover, coping strategies are context-dependent, and a coping strategy that works well in one context may not be effective in other settings<sup>[29]</sup>. Such a characteristic of coping strategies and their relationships with mental health further rationalize the research purpose of the current study: An investigation into the relationships between adolescents' mental health status and their use of coping strategies during COVID-19 in China where the pandemic was threatening the public when the present study was conducted. To achieve this purpose, three research questions (RQ)s were addressed:

- 1) **RQ1:** How is the Chinese adolescents' mental health status during COVID-19?
- 2) **RQ2:** What are the coping strategies deployed by Chinese adolescents during COVID-19?
- 3) **RQ3:** Are there any relationships between Chinese adolescents' mental health status and their use of coping strategies during COVID-19?

### **3. Methods**

#### **3.1. Participants**

This study involved 4579 voluntary Chinese high school students (Grade 7–12) via convenience sampling, a method endorsed by scholars<sup>[30]</sup> for challenging scenarios, such as the COVID-19 pandemic, where obtaining a truly random or representative sample proves difficult because adolescents were confined at home during COVID-19<sup>[1]</sup>.

All samples in this study were exclusively collected from Anhui Province, China, offering a representative depiction of regions that implemented school closures due to the pandemic. To mitigate bias and enhance the quality of data obtained through convenience sampling, information was gathered from a diverse array of schools with varying levels and categories. This encompassed five key and three ordinary senior high schools, two key and one ordinary junior high school, two ordinary junior middle schools in suburban areas, one county district key middle school (covering both middle and high school levels), and one rural middle school (encompassing both middle school and high school levels).

Among the participants, male students (N = 2064) and female students (N = 2515) accounted for 45% and 55% respectively, and their age range was 12 to 18 years (M = 15.80; SD = 1.66). Considering the vast majority of the participants were under 18 years old, after our study was approved by relevant local educational

authorities, we invited the participants and their parents to sign the consent forms. During the process, all the questions on this study from the participants and their parents were answered. Moreover, in data collection, we helped the participants use code names for anonymity

### **3.2. Instruments**

In psychology, questionnaires (also termed “inventories”, “scales, to name a few) are commonly used to measure adolescents’ mental health and their coping strategy use (e.g., Guessoum et al.<sup>[4]</sup>; Orgilés et al.<sup>[9]</sup>, Yang<sup>[24]</sup>; Ye et al.<sup>[19]</sup>). In accordance with our research questions, we employed two established instruments to assess the psychological well-being and coping strategies of the participants. The Mental Health Inventory of Middle-school students (MSSMHS) was utilized to gauge the prevalence of general mental health issues among the participants. Furthermore, the Coping Style Scale for Middle School Students (CSSMSS) was selected to investigate the specific coping strategies employed by Chinese adolescents in response to various stressors.

For the understandability and readability of the measures in their actual users, we piloted them on 20 participants. Based on this, we provided some supportive instructions when administrating the MSSMHS and the CSSMSS on the participants and answered their questions about the measures. Furthermore, both inventories were administered in mandarin Chinese to ensure cultural and linguistic appropriateness for the study’s participants.

#### **3.2.1. The mental health inventory of middle-school students (MSSMHS)**

Developed by Wang et al.<sup>[31]</sup>, the Mental Health Inventory of Middle-school Students (MSSMHS) is a well-established self-report assessment tool specifically designed to evaluate general mental health issues among Chinese adolescents. This instrument has gained significant recognition and has been extensively employed by scholars, in particular Chinese scholars in prior studies (e.g., Wu et al.<sup>[32]</sup>; Huang et al.<sup>[33]</sup>), highlighting its reliability and relevance within the field of adolescent mental health research. The MSSMHS comprises 60 items under 10 constructs: Obsessive-compulsive symptoms, paranoia, hostility, interpersonal sensitivity, depression, anxiety, academic pressure, maladjustment, emotional instability, and mental imbalance. A 5-point Likert scale is used for each item ranging from 1 (no) to 5 (severe)., The higher the score, the worse the mental health condition.

#### **3.2.2. the coping style scale for middle school students (CSSMSS)**

As noted earlier, the Coping Style Scale for Middle School Students (CSSMSS) developed by Huang et al.<sup>[27]</sup> is a widely used instrument for assessing coping strategies of Chinese adolescents. The CSSMSS comprises 30 items categorized into six constructs, and the participants were invited to rate these items on a 5-point Likert scale, with responses ranging from 1 (never use) to 5 (frequently used). Huang and colleagues<sup>[27]</sup> reported that the CSSMSS demonstrates both validity and reliability as a measurement tool. The Cronbach’s alpha coefficient for the CSSMSS was calculated at 0.77, indicating a satisfactory level of internal consistency. In our sample, we observed a Cronbach’s alpha coefficient of 0.91, evidencing a high level of internal consistency and reliability, which further rationalises the employment of the CSSMSS as a robust instrument in our study.

### **3.3. Procedures**

#### **3.3.1. Data collection**

Due to the COVID-19 pandemic, our study prioritized the safety and convenience of participants. To achieve this, we integrated both measurement instruments into a single electronic questionnaire, which was administered on the participants via the online survey platform Qwstar (<https://www.wjx.cn/index.aspx>). This

approach allowed the participants the flexibility to complete the questionnaire on either their mobile phones or computers, depending on their preference and accessibility. On average, each participant spent approximately 10 minutes to complete the questionnaire.

Before participating, each individual provided informed consent, and we placed a strong emphasis on ensuring the security and privacy of their responses. All survey data were collected anonymously, and stringent data encryption measures were implemented to safeguard participants' information. Following the data collection phase, responses were entered into the statistical software SPSS 25.0 (Windows version) for comprehensive analysis. The data entry and cleaning process involved meticulous checks for missing or incomplete responses, which were addressed according to established protocols. These measures contributed to the integrity and reliability of our analysis.

### **3.3.2. Data analysis**

To answer the research questions, we averaged the scores of the 60 items in the MSSMHS for an overall assessment of the participants' mental health status through descriptive analysis (Shao et al., 2018). With reference to the scores, we divided the participants into four groups indicating four mental health levels (Zhao, 2008): Good mental health group (Good Group) with their scores below 2 points, mild mental health problem group (Mild Group) with a score range of 2 to 2.99, a moderate level of mental health problems group (Moderate Group) with their score range being 3 to 3.99, and severe mental health problem group (Severe Group) indicated by a score range of 4 to 4.99. Similarly, in accordance with the four groups, we averaged the scores of the 30 items in CSSMSS before we ran descriptive analysis and one-way repeated measures ANOVA to examine the participants' coping strategy use across their mental health levels. In ANOVA, the participants' mental health served as the independent variable, while the coping strategies used by them were the dependent variables. To address RQ3, we ran a Pearson correlation test with  $p$  value smaller than 0.05 suggesting strong correlations between the participants' use of coping strategies and their mental health.

All the statistical procedures, assumption tests were conducted including data normality examination with reference to the values of skewness ( $-3$  to  $3$ ) and of the kurtosis ( $-8$  to  $8$ ); and the Mauchly's test of Sphericity for ANOVA (when  $p$  value is larger than 0.05, the assumption will be met). Additionally, during ANOVA,  $p$  value for  $F$ -ratio ( $p \leq 0.05$ ), and  $\eta^2$  which suggest the effect size were also inspected<sup>[34, 35]</sup>.

## **4. Results**

### **4.1. Participants' mental health status across groups**

As shown in Table 1, during COVID-19, nearly half (43.4%) of the participants (Good Group) reported good mental health, a little fewer than the figure (48.8%) for those (Mild Group) suffering from mild psychological problems. Participants (Moderate Group) with moderate psychological problems accounted for 7.2%, and those (Severe Group) who had severe mental health symptoms occupied 0.6%. Despite the variance in the participants' mental health status across groups, depression, anxiety, and academic pressure had similar frequency reported by all the participants.

In **Table 1**, we observed varying mental health status among participants during the COVID-19 period. Nearly half (43.4%) of the participants (the "Good Group") reported good mental health, slightly lower than the 48.8% in the "Mild Group", who experienced mild psychological problems. Participants in the 'Moderate Group,' with moderate psychological problems, accounted for 7.2%, while those in the 'Severe Group' with severe mental health symptoms made up 0.6% of the sample. Despite these differences in mental health status, participants across all groups reported similar frequencies of depression, anxiety, and academic pressure.

**Table 1.** Chinese adolescents' mental health status across groups.

Mental health	Good (N = 1988) 43.4%		Mild (N = 2233) 48.8%		Moderate (N = 330) 7.2%		Severe (N = 28) 0.6%	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Obsessive-compulsive symptoms	2.12	0.55	2.77	0.46	3.28	0.45	4.17	0.60
Paranoia	1.45	0.34	2.28	0.45	3.14	0.49	4.72	0.33
Hostility	1.33	0.35	2.14	0.52	3.14	0.60	4.37	0.74
Interpersonal sensitivity	1.48	0.39	2.36	0.46	3.23	0.44	4.35	0.42
Depression	1.53	0.41	2.39	0.47	3.37	0.51	4.46	0.65
Anxiety	1.46	0.42	2.53	0.52	3.60	0.54	4.74	0.31
Academic pressure	1.67	0.56	2.68	0.59	3.42	0.59	4.52	0.54
Maladjustment	1.59	0.44	2.37	0.48	3.10	0.51	4.17	0.58
Emotional instability	1.65	0.44	2.57	0.45	3.35	0.51	4.56	0.43
Mental imbalance	1.35	0.33	2.03	0.47	2.77	0.57	4.05	0.79

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

#### 4.2. Participants' coping strategy use across groups

The results of the descriptive analysis and the output of the subsequent one-way ANOVA in **Table 2** revealed that all the six coping strategies under investigation underwent significant variances across groups. To be specific, participants from the Good Group and the Mild Group used problem-solving ( $M = 3.38$ ,  $SD = 0.91$  for the former and  $M = 3.09$ ,  $SD = 0.60$  for the latter) the most frequently; those from the Moderate Group used patience ( $M = 3.34$ ,  $SD = 0.66$ ) more frequently than other coping strategies; fantasizing ( $M = 4.44$ ,  $SD = 0.82$ ) demonstrated the highest frequency in the Severe Group. Moreover, help-seeking, patience and avoiding manifested similar frequency among the four groups, whilst fantasizing illustrated the highest degree of the variance across the four groups.

**Table 2** displays the results of descriptive analysis and one-way ANOVA, indicating significant variations in all six coping strategies across groups. Specifically, participants from the 'Good Group' and the 'Mild Group' used problem-solving the most frequently, while those in the 'Moderate Group' employed patience more often. The 'Severe Group' showed the highest frequency in fantasizing. Help-seeking, patience, and avoiding demonstrated similar frequency across all groups, with fantasizing showing the highest variability among the four groups.

**Table 2.** Chinese adolescents' use of coping strategies across groups.

Mental health level	Problem-solving	Help-seeking	Avoiding	Venting	Fantasizing	Patience
Good	3.38 ± 0.91	2.88 ± 0.85	2.88 ± 0.77	2.28 ± 0.71	1.97 ± 0.84	3.06 ± 0.88
Mild	3.09 ± 0.60	2.76 ± 0.62	3.00 ± 0.53	2.49 ± 0.57	2.59 ± 0.82	3.28 ± 0.66
Moderate	2.91 ± 0.57	2.68 ± 0.72	3.07 ± 0.56	2.85 ± 0.64	3.19 ± 0.89	3.34 ± 0.66
Severe	2.83 ± 1.41	2.61 ± 1.43	3.43 ± 1.13	2.98 ± 1.17	4.44 ± 0.82	3.65 ± 1.16
<i>F</i>	72.30***	12.58***	20.74***	97.35***	364.75***	35.99***
$\eta^2$	0.045	0.008	0.013	0.061	0.193	0.023

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

### 4.3. Relationships between coping styles and mental health

Results of Pearson correlation test showed that problem-solving was significantly correlated with all mental health problems under investigation in a negative direction except for obsessive-compulsive symptoms. By contrast, help-seeking had no substantial correlations with all of the mental health problems. Further, avoiding was positively correlated with obsessive-compulsive symptoms, paranoia, interpersonal sensitivity, anxiety, and mental imbalance. Likewise, venting, fantasizing, and patience had positive correlations with all of the participants' mental health problems (see **Table 3**).

The results of the Pearson correlation test, as presented in **Table 3**, revealed significant negative correlations between problem-solving and all mental health problems, except for obsessive-compulsive symptoms. Help-seeking showed no substantial correlations with any of the mental health problems. Avoiding was positively correlated with obsessive-compulsive symptoms, paranoia, interpersonal sensitivity, anxiety, and mental imbalance. Venting, fantasizing, and patience displayed positive correlations with all of the participants' mental health problems.

**Table 3.** Relationships between Chinese adolescents' mental health status and their use of coping strategies.

Mental health	Problem-solving	Help-seeking	Avoiding	Venting	Fantasizing	Patience
Obsessive-compulsive symptoms	0.02	0.08	0.19***	0.24***	0.38***	0.21***
Paranoia	-0.16***	-0.06	0.14***	0.25***	0.44***	0.15***
Hostility	-0.21***	-0.07	0.08	0.32***	0.43***	0.11*
Interpersonal sensitivity	-0.18***	-0.06	0.15***	0.24***	0.45***	0.20***
Depression	-0.23***	-0.12	0.10	0.22***	0.41***	0.17***
Anxiety	-0.20***	-0.09	0.13***	0.23***	0.44***	0.19***
Academic pressure	-0.24***	-0.10	0.11	0.17***	0.40***	0.15***
Maladjustment	-0.19***	-0.08	0.10	0.20***	0.37***	0.11*
Emotional instability	-0.25***	-0.11	0.12	0.21***	0.43***	0.15***
Mental imbalance	-0.11	0.02	0.14***	0.29***	0.41***	0.13***

Note: \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ .

## 5. Discussion

In general, this study aims at the potential relationship between Chinese adolescent's mental health status and their use of coping strategies when confronted with disaster like the COVID-19. Our data analysis reveal that COVID-19 exerted minor influence on the mental health of Chinese adolescents, and the coping strategies used by them were similar to what they typically use in dealing with daily stress as described in literature review. This result is unexpected as it conflicts with studies of relevance conducted in the early stage of the pandemic in which Chinese adolescents' mental health were significantly impacted<sup>[18]</sup>. One possible explanation has to do with the timing of our study. When we started our survey, COVID-19 had become one part of our daily routine, and so the participants might have learned how to adjust their mental status for coping with the challenges imposed by the pandemic. Consequently, it is justifiable that they were not affected mentally as much as their peers were right after the outbreak of COVID-19 as discovered by Magson et al.<sup>[36]</sup>.

With respect to the participants' mental health status during the pandemic, depression, anxiety, academic pressure was reported in similar frequency, and this result is consistent with a large body of available literature as reviewed previously. Regarding coping strategies, problem-solving was found to be an effective strategy in the participants' dealing with mental health issues. This accounts for why Good Group and Mild Group used it the most frequently. In fact, as one of the adaptive coping strategies, problem-solving was very likely to

protect the participants from the adverse effects of COVID-19<sup>[18]</sup>, which additionally explains the highest frequency of this coping strategy reported by the Good Group and the Mild Group. On the other hand, the high frequency of fantasizing use in the Severe Group supports Chen and Huang's<sup>[37]</sup> study where Chinese adolescents with several mental health symptoms used fantasizing the most frequently. As postulated by some researchers<sup>[15,27]</sup>, fantasizing, as one of the maladaptive coping strategies, do not contribute positively to Chinese adolescents' mental health. It is, therefore, understandable that in COVID-19, participants from the Severe Group used this strategy the most frequently.

The similarity in the frequent use of avoiding, help-seeking and patience across groups is surprising, in that avoiding and patience are regarded by many researchers<sup>[25,27]</sup> as a maladaptive coping strategy for adolescents, while help-seeking is regarded as adaptive coping strategies. However, it is proposed that in most situations, Chinese adolescents tend to use avoiding and patience for self-protection, which is conducive to their temporary pressure reduction so that they are competent well to cope with additional pressure<sup>[15,38]</sup>. Such a proposal suggests that when encountering pressure from abnormal situations, using avoiding and patience benefits adolescents' mental health<sup>[39,40]</sup>. This elucidates why all the participants, including the Good Group turned to avoiding and patience strategy for addressing mental issues. Likewise, although help-seeking, as an adaptive coping strategy, is proposed to be seldom used by those suffering serious mental problems, this strategy was used as frequently by the Severe Group as the other groups did. The result may be explained by the fact that the participants in our study lived with their parents during COVID-19. As Qi et al.<sup>[13]</sup> and Zhou et al.<sup>[41]</sup> postulated, adolescents tend to seek help from their parents in dealing with mental health problems. It is, therefore, very likely that the Severe Group sought help from their parents during the pandemic and hence used the help-seeking strategy frequently.

## **6. Conclusion**

Our study reveals that during COVID-19, Chinese adolescents generally suffered from anxiety, depression and academic pressure, and they tended to use avoiding, patience and help-seeking to cope their mental health issues. Further, problem-solving was identified as an effective coping strategy and participants facing severe mental issues used fantasizing the most frequently. These findings are expected to provide some insights into how educators offer appropriate mental health instructions to adolescents so that they can cope with pressure and stress from some challenging situations.

Among available coping strategies, although avoiding and patience has been proved to be an effective adaptive strategy in helping adolescents' mental balance as illustrated by our study, they, as maladaptive coping strategies, cannot contribute to these young students' sustainable mental health<sup>[38,39]</sup>. Therefore, we suggest that educators adopt a cautious approach to teaching these strategies in classroom instructions when training adolescents to cope with mental health issues especially in high-risks situations. Similarly, given the strong correlation between fantasizing and the participants suffering from severe mental issues, this strategy is proposed to be taught in a cautious manner. On the other hand, educators should teach students to priorities effective strategies such as problem-solving and help-seeking in coping with mental health issues as evidenced by this study. Through offering such mental health instructions, educators will empower their students to mentally cope with life stressors in an effective manner. Last but not least, the findings on Chinese adolescents' mental health status during the pandemic will help policy-makers and relevant high-stake holders tailor early interventions that would mitigate the adverse effects of disasters like COVID-19 on adolescents and even the general public.

Despite the above contributing implications, this study has some limitations. In data collection, we did not triangulate the questionnaire data with those from other instruments, which may negatively affect the



reliability of our research findings. Furthermore, coping was measured at a single time point, preventing us from examining changes in coping strategies over time. Also, due to research constraint, we primarily focused on the relationships between Chinese adolescents' mental health statuses and their use of coping strategies in COVID-19, and hence we did not examine what factors that may affect such relationships. For a comprehensive understanding of the relationships, an examination of these factors is merited in future studies.

## **Author contributions**

Conceptualization, BH and WZ; methodology, KZ; software, WZ; validation, WL; formal analysis, KZ; investigation, BH; resources, WZ; data curation, BH; writing—original draft preparation, WZ; writing—review and editing, WL; visualization, WL.; supervision, WZ.; project administration, BH; funding acquisition, WL. All authors have read and agreed to the published version of the manuscript.

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## **Conflict of interest**

The authors declare no conflict of interest.

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