



Exploring the Impact of Emotional and Cognitive Factors on Anxiety Symptoms of Chinese Adolescents: a Serial Mediation Study

Junsong Fei¹ · Yueyang Hu¹ · Leilei Liang¹ · Cuicui Meng¹ · Songli Mei¹ 

Accepted: 27 December 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

Abstract

The onset age of anxiety is decreasing worldwide, yet the majority of the study conducted on anxiety were focused on adult populations. This study aimed to investigate the mediating effect of psychological capital and coping style tendency on the relationship between emotional intelligence and anxiety in Chinese adolescents and provide empirical evidence for research and prevention. A cross-sectional study recruited 5747 participants from 5 randomly selected middle schools in the northeast China. Study results showed that high emotional intelligence ($P < 0.05$), high level of psychological capital ($P < 0.05$), and positive coping style tendency ($P < 0.05$) were correlated to lower level of anxiety symptoms in adolescents. Psychological capital and coping style tendency performed partial and serial mediating effect on the relationship between emotional intelligence and anxiety. Teaching adolescents how to regulate emotions can strengthens their positive mentalities, promotes the use of positive coping strategies, and then attenuates the severity of anxiety symptoms in a nonadditive manner.

Keywords Emotional intelligence · Coping style tendency · Psychological capital · Anxiety · Adolescent · Serial mediation

The high prevalence of anxiety is always a grave problem in the modern society. By 2019, 301 million people were living with an anxiety disorder including 58 million children, and the prevalence of anxiety increased by a massive 25% since COVID-19 (Novel Coronavirus 2019) rampaging the world (WHO, 2022). As one of the most common psychological problems across the globe, anxiety considerably disrupts people's daily lives. The effect is especially significant in adolescents, who are experiencing high pressures from the increasing academic requirements (Romano et al., 2020) and other internal stressors due to various social, psychological, and physiological changes during this period. Researchers have found that prolonged anxiety in adolescents can trigger physiological changes in the brain and lead to mental disorders such as anxiety and depression in adulthood (Cummings et al.,

✉ Songli Mei
meisongli@sina.com

¹ Department of Social Medicine and Health Management, Jilin University, Changchun, Jilin 130021, China

2021). Severe anxiety was also found to be associated with severe sleep problems, addictive behaviors, poor academic performance, and worse quality of life in children (Li et al., 2022; Raknes et al., 2017). Adolescence is a crucial developmental stage which involves rapid changes in the brain and body, and has a profound impact on people's future lives. Thus, it is vital to understand specific mechanisms of anxiety during adolescence and identify protective factors in order to improve adolescents' mental well-being both at present and in the future.

Emotional Intelligence and Anxiety

Emotional intelligence is defined as the ability to accurately perceive and interpret the emotion of others, which also include the ability to control and express one's own emotions (Salovey & Sluyter, 1997). Many studies argued that stress management is a key function of emotional intelligence (Noorbakhsh et al., 2010; Sarabia-Cobo et al., 2017). When facing a stressful event, primal emotions like anger and fear overpower the reason of those who are unable to control their emotions, resulting in impulsive, irritable, and occasionally, destructive behaviors (Fteiha & Awwad, 2020; Goleman, 1995). If people can control their emotions properly, they may ease up the impact of negative feelings and avoid health-risking behaviors. Higher emotional intelligence is associated with better personal well-being (Schutte et al., 2007) and increased health-promoting behaviors (Fermamdez-Berrocal & Cabello, 2016; Shen et al., 2022). Other studies found that people with lower emotional intelligence are unlikely to maintain interpersonal relationships; hence, they cannot expect supports from others when in trouble and more likely to develop social withdrawal and avoidance (Cejudo et al., 2018; Moradi et al., 2011). Based on Daniel Goleman's proposition, which said emotional intelligence is an individual's ability to curb negative feelings and replace them with positive emotions (Fteiha & Awwad, 2020), the present study constructed the following hypothesis:

Hypothesis 1. Emotional intelligence is negatively correlated to the severity of anxiety.

The Mediating Role of Psychological Capital

Psychological capital, a set of psychological resources that an individual can use to accomplish personal goals which consists of four distinct attributes: self-efficacy, optimism, hope, and resilience (Luthans & Youssef-Morgan, 2017), is one of the concepts addressed in the positive psychology domain. According to Robert Rosenthal's Pygmalion effect, high hope and expectations can dramatically increase students' confidence and academic performances (Rosenthal & Jacobson, 2003); therefore, many believe that positive emotions and mentalities are crucial to people's work or academic performances (Abdollahi & Abu Talib, 2015), psychological well-being, happiness, and quality of life (Chafouleas & Bray, 2004). In addition, previous studies revealed that a high level of psychological capital can help individuals to build stronger resistance to stress (Duan et al., 2022; Rabenu et al., 2017), minimize the adverse impact of negative events (Jalil et al., 2021; Zhu et al., 2022), and reduce burnout and other emotional distress (Finch et al., 2020; Xiong et al., 2020). Since one of the key features of emotional intelligence is to replace negative emotions with positive ones (Fteiha & Awwad, 2020), it is reasonable to assume that the availability of

positive psychological resources can greatly influence the effect of emotional intelligence on one's mental state. All in all, the following hypothesis was proposed:

Hypothesis 2. Psychological capital will mediate the relationship between emotional intelligence and anxiety.

The Mediating Role of Coping Style Tendency

Lazarus and Folkman (1984) defined coping as the cognitive and behavioral efforts to either resolve the problem or minimize the negative effect of stressful situations. In general, coping strategies can be categorized into positive (active) and negative (dysfunctional) coping style (Gonzalez-Yubero et al., 2021). Positive coping suggests the individual proactively looking for solutions to problems, which involve strategies like cognitive reassessment and seeking for social support. Individuals can build confidence and self-efficacy as the result of resolving difficult situations (Bandura, 1977) and promoting growth and health (Compas et al., 2001; Kruczek & Basinska, 2018). On the other hand, people who like to rely on negative coping strategies focus on avoiding problems or delegating solutions to external forces. When people feel the situation is out of control, they are more likely to use negative coping strategies to alleviate the stress. Substance abuse and internet addiction are typical methods to divert people's attention from the harsh reality (Gonzalez-Yubero et al., 2021; Sun et al., 2019), and if the stressor is persistent and cannot be ignored, it will cause mental distress (Gregg et al., 2014; Zheng et al., 2020).

Coping style tendency refers to an individual's cognitive preference on coping style. No one is guaranteed to use only positive or negative coping strategies forever; in some circumstances, a strong-willed individual may as well choose to evade the problem rather than face it. Coping style tendency reflects the general trend of coping style that people like to deploy when they encounter problems. Although the term "coping style tendency" has rarely been used in literatures, sufficient study results indicated that a high level of emotional intelligence amplifies the effect of positive coping and reduces the use of negative coping strategies (Davis & Humphrey, 2012; Mitic et al., 2020). Studies also showed that proactive coping reduces stress level (Ebstein et al., 2019), and frequent use of negative coping strategies was associated with higher risk of mental disorders like anxiety and depression (Li & Miller, 2016). As a result, the study proposed the following hypothesis:

Hypothesis 3. Coping style tendency will mediate the relationship between emotional intelligence and anxiety.

The Serial Mediating Role of Psychological Capital and Coping Style Tendency

According to the broaden-and-build theory (Fredrickson, 1998), positive emotions such as happiness could broaden thought-action repertoires, enabling people to build novel thoughts and take exploratory actions. In other words, a positive mentality elevates people's ability of thinking and motivates them to proactively eliminate the stressor. Jing et al. (2022) pointed out that psychological capital provides people with the energy they need to confront stressors, and the success in resolving difficult situations will generate confidence and psychological satisfaction which protect people from emotional distress and mental disorders. The finding was supported by several studies (Jalil et al., 2021; Wu et al., 2020); however, most studies were conducted on college students or other adult population.

Limited research has investigated the relationship between these variables in the underage population. Based on the aforementioned theories and findings, the following hypothesis was proposed:

Hypothesis 4. Psychological capital and coping style tendency perform a chain mediating effect on the relationship between emotional intelligence and anxiety in Chinese adolescents.

The Present Study

To the best of our knowledge, the majority of studies conducted on emotional intelligence, coping, and anxiety were focused on the adult population and specific occupational groups. However, with the increasing demand for higher educational backgrounds and highly competitive academic environment due to the high population density in China, Chinese adolescents are experiencing tremendous pressures from schools and parents (Zhu et al., 2021), and they have far less methods to deal with mental distress than adults. Thus, the identification of protective factors against anxiety for adolescents in the Chinese culture is both valuable and important. The present study sought to fill some gaps in the literature by examining whether psychological capital and coping style tendency play serial mediation roles in the relationship between emotional intelligence and anxiety in the Chinese underage population. A serial mediation model was constructed in Fig. 1.

Method

Participants and Design

The study applied the cluster sampling method to collect data from 5 middle schools in northeast China. Printed questionnaires were distributed to entire Grade 7, 8, and 9 students in each school, and students were asked to complete the questionnaire independently under the supervision of homeroom teachers. The survey was administrated on a single day. After excluding questionnaires with blanks or obvious response patterns (e.g., same options for the entire scale, options making a zigzag pattern, similar items with opposite responses), the database was finalized with 5747 valid samples and a 94% effective response rate.

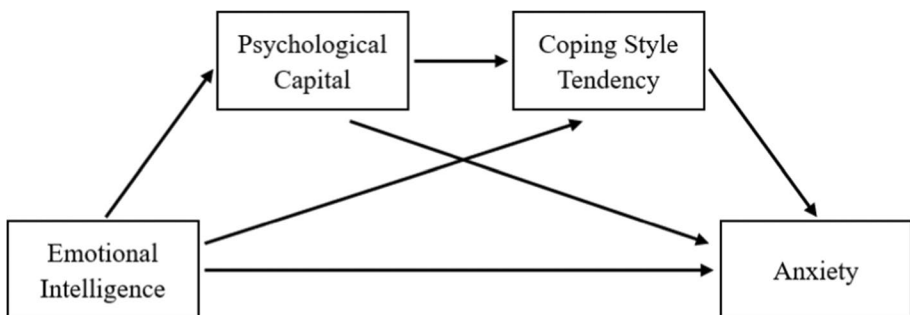


Fig. 1 Conceptual framework of the serial mediation model

Instruments

Wong and Law Emotional Intelligence Scale (WLEIS)

Wong and Law Emotional Intelligence Scale is one of the most widely used self-report measurements of emotional intelligence. The questionnaire is comprised of 16 items which test on four aspects: the ability to recognize and interpret one's own emotions, the ability to recognize and interpret other's emotions, the ability to control one's own emotions, and the ability to express one's own emotions (Law & Wong, 2004). All items were answered on 5-point Likert scales (1—strongly disagree, 2—disagree, 3—not sure, 4—agree, 5—strongly agree). The total score is between 16 and 80, with a higher score indicating higher overall emotional intelligence of the respondent. The Cronbach's alpha in this study is 0.92.

Psychological Capital Questionnaire for Junior High Students

Psychological Capital Questionnaire for Junior High Students was designed specifically to measure the psychological capital level of Chinese adolescents (Ma, 2014). The survey consisted of 25 items, and each item was answered on a 5-point Likert scale with options from 1 (strongly disagree) to 5 (strongly agree). The total score ranges from 25 to 125. A higher score suggests that the respondent possesses a more positive and optimistic psychological state and has stronger self-discipline. The Cronbach's alpha of the questionnaire is 0.95.

Simplified Coping Style Questionnaire (SCSQ)

Simplified Coping Style Questionnaire, the adapted version of Coping Strategies Questionnaire developed by Rosenstiel and Keefe in 1983, was designed specially to test the Chinese population. Twenty items were answered on the 4-point Likert scale (0—never, 1—occasionally, 2—sometimes, 3—always). The questionnaire comprises two dimensions: item 1 to 12 measure positive coping strategies like “I tell my worries to a friend,” and item 13 to 20 measure negative coping strategies like “I use substances to relax.” It is worth mentioning that scores only reveal the type and frequency of different coping strategies that an individual likes to use during adversities. The score does not indicate whether the individual has a positive or negative tendency. Someone who occasionally tries many positive strategies and someone who relies heavily on few positive strategies may display the same scores in the end, but the meaning represented by these scores are dramatically different. Chinese psychologist Xiaoyang Dai developed a mathematical equation that can calculate people's coping style tendencies based on their ratings on SCSQ (Xie et al., 2015):

$$\begin{aligned} & \text{Coping style tendency} \\ &= \frac{\text{Individual score on positive coping style} - \text{Study population's average score on positive coping style}}{\text{Standard deviation of population's average on positive coping style}} \\ &- \frac{\text{Individual score on negative coping style} - \text{Study population's average score on negative coping style}}{\text{Standard deviation of population's average on negative coping style}} \end{aligned}$$

If the coping style tendency score is positive, it suggests that the respondent is more likely to choose positive coping strategies to deal with adversities in life; likewise, if the coping style tendency score is negative, it indicates that people incline to use negative coping strategies when they face problems. The Cronbach's alpha of the questionnaire is 0.88.

The Screen for Child Anxiety Related Emotional Disorders (SCARED)

SCARED, created by Birmaher in 1997, was designed to identify anxiety severity in children between 8 and 18 years old. Due to its self-report nature, the result is not appropriate to be recognized as clinical diagnosis. Therefore, we classified the result as subclinical anxiety. The Chinese version of the survey was revised by Wang et al. (2002). The questionnaire used 38 items to screen for 5 types of anxiety: somatic, generalized anxiety, separation anxiety, social phobia, and school phobia. This particular study only used the generalized anxiety subscale to represent the anxiety severity of participants. Nine items were answered on 3-point Likert scales (1 = never, 2 = sometimes, 3 = always). The total score is between 9 and 27, with a higher score indicating that the child has more severe generalized anxiety symptoms. The Cronbach's alpha in the study is 0.93.

Data Analysis

Demographic variables, emotional intelligence, psychological capital, coping style tendency, and anxiety were described with mean and standard deviation ($M \pm SD$), number (N), and percentage (%) as appropriate. Pearson correlation coefficients (r) were used to describe the interdependency between study variables. Since the study needs to use regression analysis, Kurtosis and Skewness values were displayed to show the data distribution of variables.

Hierarchical regression models were used to test study hypotheses. Three models were created during the process. Model 1 only tested the effect of the independent variable (emotional intelligence) on the dependent variable (anxiety) without the interference of mediating variables. Psychological capital and coping style tendency were added separately in models 2 and 3 to examine their mediating effects on the relationship between emotional intelligence and anxiety.

After proving that psychological capital and coping style tendency are significant mediators in the relationship between emotional intelligence and anxiety, the serial mediation analysis was performed with PROCESS v 3.4.1 Model 6 (Hayes, 2017). In total, three associations were tested in the analysis: emotional intelligence to psychological capital to anxiety; emotional intelligence to coping style tendency to anxiety; and emotional intelligence to psychological capital to coping style tendency to anxiety. 5,000 bootstrap sample size and 95% confidence intervals were used in all analytical methods, where $P < 0.05$ level represents the existence of statistically significant results.

Table 1 Descriptive statistics of the study sample ($n=5747$)

Variable	Value
Gender, n (%)	
Male	2932 (51.0)
Female	2815 (49.0)
Age, $M \pm SD$	13.70 ± 0.97
Grade, n (%)	
7	2616 (45.5)
8	2125 (37.0)
9	1006 (17.5)
Only child, n (%)	
Yes	3600 (62.7)
No	2147 (37.3)
Study variables, $M \pm SD$	
Emotional intelligence	55.23 ± 11.78
Psychological capital	83.19 ± 21.08
Coping style tendency	-0.01 ± 1.17
Anxiety	17.06 ± 5.09

Results

Descriptive Statistics

Descriptive statistics of participants were displayed in Table 1. Among 5747 Chinese adolescents, there were 2932 (51%) males and 2815 (49.0%) females. In terms of grade, 2616 (45.5%) students were enrolled in the seventh grade, 2125 (37.0%) were in the eighth grade, and 1006 (17.5%) were in the ninth grade. The average age of participants was 13.7 ± 0.99 years old.

Pearson's correlation coefficients (r) were used to express the interdependence between study variables (Table 2). Emotional intelligence has statistically significant positive correlations with psychological capital ($r=0.606$, $P<0.01$) and coping style tendency ($r=0.372$, $P<0.01$). The correlation between psychological capital and coping style tendency is also positive ($r=0.498$, $P<0.01$). Anxiety has statistically significant negative correlations with emotional intelligence ($r=-0.195$, $P<0.01$), psychological capital ($r=-0.255$, $P<0.01$), and coping style tendency ($r=-0.329$, $P<0.01$).

Table 2 Pearson's correlation coefficients of variables

Variable	1	2	3	4
Emotional intelligence	1			
Psychological capital	0.606**	1		
Coping style tendency	0.372**	0.498**	1	
Anxiety	-0.195**	-0.255**	-0.329**	1
Kurtosis	1.022	-0.044	0.246	-0.855
Skewness	-0.286	-0.028	0.267	0.134

** $p<0.01$ level

Hair et al. (2010) proposed that data demonstrates a normal distribution if the skewness value is between -2 and $+2$, and the kurtosis value is between -7 and $+7$. Therefore, all study variables showed standard normal distributions and viable for regression analysis.

Hierarchical Regression Analysis

The results of the hierarchical regression analysis are shown in Table 3. Model 1 revealed a significant negative association ($\beta = -0.20, p < 0.001$) between emotional intelligence and anxiety, suggesting that adolescents with lower emotional intelligence show more severe anxiety symptoms. Model 2 showed that psychological capital was significantly and negatively correlated with anxiety ($\beta = -0.22, p < 0.001$), indicating that adolescents with more pessimistic psychological states show more severe anxiety. Finally, model 3 showed that coping style tendency was negatively associated with anxiety ($\beta = -0.27, p < 0.001$), which suggested that anxiety is often observed in adolescents who like to use negative coping strategies to deal with problems. Notably, the independent variable (emotional intelligence) still shows significant influence on the dependent variable (anxiety) after introducing mediating variables (psychological capital and coping style tendency) into the model, it implies that the mediating variables demonstrated partial mediation effects in the relationship. In addition, the variance inflation factor (VIF) values for emotional intelligence, psychological capital, and coping style tendency were 1.58, 1.16, and 1.35, respectively. According to Johnston et al. (2018), a VIF value smaller than 2.5 means that the correlation is not strong enough to warrant corrective measure.

Serial Mediation Analysis

Serial mediation analysis was used to test whether psychological capital and coping style tendency perform a chain mediating effect on the relationship between emotional intelligence and anxiety of adolescents.

To begin with, results (Fig. 2) showed emotional intelligence ($\beta = -0.035, P < 0.05$), psychological capital ($\beta = -0.101, P < 0.05$), and coping style tendency ($\beta = -0.266, P < 0.05$) all had statistically significant direct influences on the severity of anxiety in

Table 3 Summary of hierarchical regression analysis for anxiety

Variables	Model 1		Model 2		Model 3	
	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Emotional intelligence	-0.20	-15.06***	-0.06	-4.01***	-0.04	-2.22***
Psychological capital			-0.22	-13.47***	-0.10	-6.05***
Coping style tendency					-0.27	-18.49***
Adjusted R^2	0.04		0.07		0.12	
<i>F</i> -value	226.90***		207.71***		260.62***	

*** $p < 0.001$ level

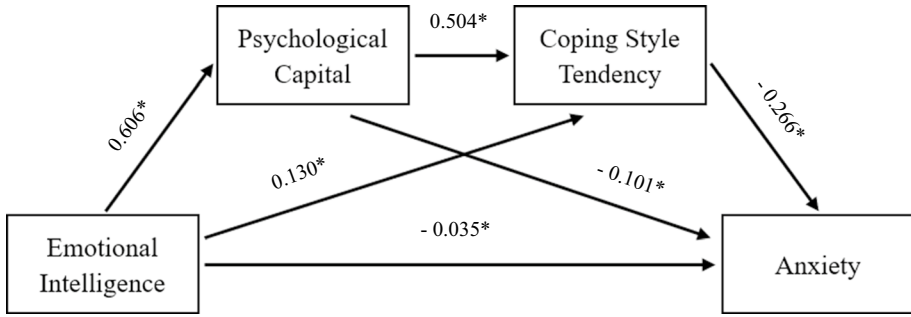


Fig. 2 The serial mediation of psychological capital and coping style tendency (* $p < 0.05$ level)

adolescents. The positive coefficients suggested that higher emotional intelligence is associated with more optimistic psychological state ($\beta = 0.606, P < 0.05$) and stronger tendency of using positive coping strategies during adversities ($\beta = 0.130, P < 0.05$). More cheerful and hopeful mentality was also associated with stronger tendency of using positive coping strategies ($\beta = 0.504, P < 0.05$).

In total, three mediation pathways were tested in the serial mediation model (Table 4). Based on the use of 95% confidence intervals (CI) as evidence, the mediation pathway would be significant if neither the lower limit nor the upper limit confidence interval contains zero. In this sense, the total indirect effect ($\beta = -0.160, CI: -0.184 \sim -0.136$), the pathway from emotional intelligence to anxiety via psychological capital ($\beta = -0.061, CI: -0.085 \sim -0.037$), the pathway from emotional intelligence to anxiety via coping style tendency ($\beta = -0.029, CI: -0.039 \sim -0.020$), and the pathway from emotional intelligence to anxiety via psychological capital and coping style tendency ($\beta = -0.069, CI: -0.080 \sim -0.060$) all showed statistically significant mediating effects. Results confirmed the serial mediating effect of psychological capital and coping style tendency on the relationship between emotional intelligence

Table 4 Mediation effects of level of psychological capital and coping style tendency on the relationship between emotional intelligence and anxiety

Outcome: anxiety	Standardized coefficient (β)	SE	Bootstrapping (95% CI)	
			Lower limit	Upper limit
Total effect	-0.195	0.013	-0.220	-0.170
Direct effect				
EI	-0.035	0.016	-0.065	-0.004
Mediator: PsyCap	-0.101	0.017	-0.134	-0.068
Mediator: CST	-0.266	0.014	-0.294	-0.238
Indirect effect				
Total indirect effect	-0.160	0.012	-0.184	-0.136
via PsyCap	-0.061	0.012	-0.085	-0.037
via CST	-0.029	0.005	-0.039	-0.020
via PsyCap + CST	-0.069	0.005	-0.080	-0.060

EI emotional intelligence, PsyCap psychological capital, CST coping style tendency, Anxiety severity of subclinical anxiety measured by self-report questionnaire

and anxiety in Chinese adolescents. In sum, a high level of emotional intelligence could significantly reduce the severity of anxiety symptoms in individuals, and this correlation can be further enhanced by building a high level of psychological capital and stronger positive coping style tendency.

Discussion

The study constructed a serial mediation model to explore the indirect effect of emotional intelligence on anxiety through psychological capital and coping style tendency. Since it focused on the identification of protective factors against anxiety in adolescents, the study sample did not target children with a clinical diagnosis of anxiety, but included the general student population who show any severity of anxiety symptoms. The academic environment in which adolescents are currently living has become increasingly competitive and high-pressure, with heavy workloads and the added pressure of entrance exams (Ye et al., 2019). This, combined with the prevalence of cram schools and homework, can create a significant amount of stress for adolescents. As such, understanding how to effectively cope with stress and stress-related disorders has become an important topic for parents, schools, and society. Based on a survey of 5747 Chinese middle school students, findings demonstrated that all hypothesized effects were significant, suggesting that the association between emotional intelligence and anxiety could be partially explained by psychological capital and coping style tendency.

As hypothesized, the study found that emotional intelligence was negatively associated with anxiety (Cejudo et al., 2018; Schutte et al., 2007). Consistent with the self-awareness theory, which proposed that individuals with a better understanding of the self will have better control over their emotional experience and do not easily let negative emotions affect their thoughts and behaviors (Phillips & Silvia, 2005). The result of the present study showed that adolescents with higher emotional intelligence express less severe anxiety symptoms. Emotionally intelligent individuals often have strong control over their own emotions. Therefore, they are less likely to have emotional outbursts which could result in adverse consequences in life (Goleman, 1995) and correspondingly high stress levels (Fteiha & Awwad, 2020). Moreover, according to the drive theory proposed by Sigmund Freud, people are motivated to take actions in order to reduce internal tensions. If people have a better understanding of their own feelings, they can carry out timely and accurate interventions to minimize the negative impact of internal distress. Otherwise, ambiguous feelings could affect the unconscious mind and manifest in deviant behaviors.

In line with previous studies, hypothesis 2 was supported since the indirect effect of emotional intelligence on anxiety through psychological capital was significant (Finch et al., 2020; Rabenu et al., 2017). Notably, results from the hierarchical regression analysis (Table 3) showed that the effect of emotional intelligence on anxiety weakened after introducing psychological capital as the mediating variable. High emotional intelligence only means that individuals are better at controlling their emotions and unlikely to display mood swings. The ego depletion theory argued that self-control draws from a limited pool of mental resources (Hagger et al., 2010). If people cannot use positive mentalities to neutralize the adverse impact of negative emotions and recover from them, soon or later, their mental resources will exhaust, and they will still suffer. The finding emphasized the important role of building and maintaining a stable positive mentality in the daily life. An

optimistic and cheerful mind can boost people's confidence and encourage them to take proactive actions to deal with emotional distress (Chafouleas & Bray, 2004).

Furthermore, coping style tendency also mediated the relationship between emotional intelligence and anxiety, which confirmed hypothesis 3. As the availability heuristic theory pointed out, people have a tendency of making decisions based on recent information or frequent experience that is readily available to them (Tversky & Kahneman, 1973). People who take on challenges have higher chances of achieving accomplishments in life. Such positive experience can reinforce beneficial behaviors and encourage them to take same actions when under similar situations. On the contrary, people with less control over their emotions could get overwhelmed by stress, which could result in irrational actions followed by adverse consequences. Therefore, it is important for adolescents to develop positive strategies to cope with academic stress; otherwise, it could jeopardize their academic performance (Edwards & Trimble, 1992) and increase the risk of developing mental disorders like anxiety (Sigmon et al., 2004; Thorne et al., 2013).

At last, hypothesis 4 of the study was supported. Results indicated that psychological capital and coping style tendency play not only parallel but also serial mediating roles in the relationship between emotional intelligence and anxiety. This particular result identifies emotional intelligence, psychological capital, and coping style tendency as three protective factors against anxiety. As a result of the joint effort, high emotional intelligence offers people a stronger internal locus of control (Luthans & Youssef-Morgan, 2017), which could increase their opportunities to experience positive emotions under stressful situations (Sánchez-Álvarez et al., 2016) and facilitate the use of proactive coping strategies to resolve problems. Ultimately, three factors reduce the level of stress and the risk of stress-related disorders. The process shares similar characteristics with the cognitive behavioral therapy (CBT). In particular, by reinforcing adolescents' emotional skills and helping them to accumulate positive psychological resources, we are remodeling their cognitive process into believing stress is not unbeatable, which can promote proactive actions and minimize the negative impact of stressful situations on their mental health. However, the result of the hierarchical regression analysis revealed partial mediating effects of psychological capital and coping style tendency on the relationship between emotional intelligence and anxiety, suggesting there are more factors that can influence the main relationship and require further investigations.

Practical Implications

As the most widespread mental health disorder during adolescence (Akgül & Ergin, 2021), anxiety affects people both somatically and psychologically. In serious cases, it can lead to social withdrawal, phobia, and even suicide. Theoretically, the present work makes a contribution to the research of adolescents' mental health by providing a relatively comprehensive explanation of the mechanisms in the relation between emotions, cognition, and anxiety. Specially, our theoretical model illustrated the process of how emotional intelligence exerts influences on psychological state and cognitive process and subsequently affects the severity of anxiety symptoms in adolescents.

Practically, our findings implied potential directions for the prevention and intervention of anxiety in adolescents. Specifically, assisting adolescents to practice their emotional skills, building positive mentalities, and training them to use positive coping strategies have proved to be effective strategies to reduce the risk of anxiety symptoms. As a matter of fact, plenty of camping programs already provided that outdoor activities can significantly increase people's

emotional abilities (Uhls et al., 2014). Moreover, since the social circle of middle school students is limited to school and home, caring from parents and teachers will be the major social resources that adolescents use to develop various psychological states and cognitive abilities. Proper guidance from adults could significantly strengthen adolescents' mentalities and coping style. Adolescents are going through a confusing and complicated period of development, and it is the adults' jobs to help them to navigate the growth and mental health.

Limitations and Future Direction

Several study limitations are of note. First of all, the current study is a cross-sectional design, and it cannot draw any causal conclusion. Secondly, data was collected through self-reported questionnaires. There is a possibility that responses were biased and unable to reflect participants' true levels on each scale. Lastly, the sample pool was limited to a single city in China; hence, the result could not represent a larger population. In the future, we recommend to re-test our model with a larger number and diversity of the population, because in a vast and populated country like China, regional cultures often have significant influences on shaping children's growth and thinking. We also recommend to consider other factors in the model, such as the role of parents and social relations in the development of emotional intelligence and psychological capital during adolescence.

Acknowledgements We thank the principals of five middle schools for their approvals and generous supports during the data collection. We also want to express our gratitude to the homeroom teachers who supervised the completion of questionnaires and all senior university students that assisted us in encoding questionnaires and building the database.

Author Contribution All authors contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Yueyang Hu, Leilei Liang, and Cuicui Meng. The first draft of the manuscript was written by Junsong Fei, and all authors commented on the previous version of the manuscript. All study procedures and analyses were supervised by Songli Mei. All authors have read and approved the final draft.

Funding The study was supported by the Project of the Fourteenth Five Year Plan for Educational Science in Jilin Province (grant number ZD22150), and Science Research of the Department of Education of Jilin Province (JJKH20220956SK).

Data Availability Research data are available upon request from the corresponding author.

Declarations

Ethical Approval Data used in the current study was gathered through questionnaires, not through the manipulation of subjects. All study procedures performed during the investigation that involve human participants were approved by the Ethical Review Board of the institution. Because all participants were children under 18 years old, hence, informed consent was obtained from the principal of each school and legal guardians of students prior to the investigation. We ensured the anonymity and discretion of the study results.

References

- Abdollahi, A., & Abu Talib, M. (2015). Emotional intelligence moderates perfectionism and test anxiety among Iranian students. *School Psychology International*, 36(5), 498–512. <https://doi.org/10.1177/0143034315603445>

- Akgül, G., & Ergin, D. A. (2021). Adolescents' and parents' anxiety during COVID-19: Is there a role of cyberchondriasis and emotion regulation through the internet? *Current Psychology*, 40, 4750–4759. <https://doi.org/10.1007/s12144-020-01229-7>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215. <https://doi.org/10.1037/0033-295X.84.2.191>
- Cejudo, J., Rodrigo-Ruiz, D., Lopez-Delgado, M. L., & Losada, L. (2018). Emotional intelligence and its relationship with levels of social anxiety and stress in adolescents. *International Journal of Environmental Research and Public Health*, 15(6), 1073. <https://doi.org/10.3390/ijerph15061073>
- Chafouleas, S. M., & Bray, M. A. (2004). Introducing positive psychology: Finding a place within school psychology. *Psychology in the Schools*, 41(1), 1–5. <https://doi.org/10.1002/pits.10133>
- Compas, B. E., Connor-Smith, J. K., Saltzman, H., Thomsen, A. H., & Wadsworth, M. E. (2001). Coping with stress during childhood and adolescence: Problems, progress, and potential in theory and research. *Psychological Bulletin*, 127(1), 87–127. <https://doi.org/10.1037//0033-2909.127.1.87>
- Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2021). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin*, 140(3), 816–845. <https://doi.org/10.1037/a0034733>
- Davis, S. K., & Humphrey, N. (2012). The influence of emotional intelligence (EI) on coping and mental health in adolescence: Divergent roles for trait and ability EI. *Journal of Adolescence*, 35(5), 1369–1379. <https://doi.org/10.1016/j.adolescence.2012.05.007>
- Duan, Y., He, J., Zheng, R. J., Feng, X. Q., & Xiao, H. Y. (2022). The relationship between disaster preparedness, psychological capital, and coping style among nurses: A cross-sectional study from China. *Perspectives in Psychiatric Care*, 58(4), 2577–2584. <https://doi.org/10.1111/ppc.13097>
- Ebstein, A. M. M., Eller, L. S., Tan, K. S., Cherniss, C., Ruggiero, J. S., & Cimiotti, J. P. (2019). The relationship between coping, occupational stress, and emotional intelligence in newly hired oncology nurses. *Psycho-Oncology*, 28(2), 278–283. <https://doi.org/10.1002/pon.4937>
- Edwards, J. M., & Trimble, K. (1992). Anxiety, coping and academic-performance. *Anxiety Stress and Coping*, 5(4), 337–350. <https://doi.org/10.1016/j.sbspro.2010.12.067>
- Fernandez-Berrocá, P., & Cabello, R. (2016). Commentary: Dimensions of emotional intelligence related to physical and mental health and to health behaviors. *Frontiers in Psychology*, 7, 441. <https://doi.org/10.3389/fpsyg.2016.00441>
- Finch, J., Farrell, L. J., & Waters, A. M. (2020). Searching for the HERO in youth: Does psychological capital (PsyCap) predict mental health symptoms and subjective wellbeing in Australian school-aged children and adolescents? *Child Psychiatry and Human Development*, 51, 1025–1036. <https://doi.org/10.1007/s10578-020-01023-3>
- Fredrickson, B. L. (1998). What good are positive emotions. *Review of general psychology: journal of Division 1 of the American Psychological Association*, 2(3), 300–319. <https://doi.org/10.1037/1089-2680.2.3.300>
- Fteiha, M., & Awwad, N. (2020). Emotional intelligence and its relationship with stress coping style. *Health Psychology Open*, 7(2). <https://doi.org/10.1177/2055102920970416>
- Goleman, D. (1995). *Emotional Intelligence*. Bantam Books.
- Gonzalez-Yubero, S., Lazaro-Visa, S., & Palomera, R. (2021). Personal variables of protection against cannabis use in adolescence: The roles of emotional intelligence, coping styles, and assertiveness as associated factors. *International Journal of Environmental Research and Public Health*, 18(11), 5576. <https://doi.org/10.3390/ijerph18115576>
- Gregg, L., Haddock, G., Emsley, R., & Barrowclough, C. (2014). Reasons for substance use and their relationship to subclinical psychotic and affective symptoms, coping and substance use in a nonclinical sample. *Psychology of Addictive Behaviors*, 28(1), 247–256. <https://doi.org/10.1037/a0034761>
- Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin*, 136(4), 495–525. <https://doi.org/10.1037/a0019486>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Pearson.
- Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). The Guilford Press.
- Jalil, M. F., Ali, A., Ahmed, Z., & Kamarulzaman, R. (2021). The mediating effect of coping strategies between psychological capital and small tourism organization resilience: insights from the COVID-19 pandemic, Malaysia. *Frontiers in Psychology*, 12, 766528. <https://doi.org/10.3389/fpsyg.2021.766528>
- Jing, X. Z., Meng, H. L., Li, Y. P., Lu, L. E., & Yao, Y. C. (2022). Associations of psychological capital, coping style and emotional intelligence with self-rated health status of college students in China during

- COVID-19 pandemic. *Psychology Research and Behavior Management*, 15, 2587–2597. <https://doi.org/10.2147/PRBM.S383743>
- Johnston, R., Jones, K., & Manley, D. (2018). Confounding and collinearity in regression analysis: A cautionary tale and an alternative procedure, illustrated by studies of British voting behaviour. *Quality and Quantity*, 52(4), 1957–1976. <https://doi.org/10.1007/s11135-017-0584-6>
- Kruczek, A., & Basinska, M. A. (2018). Humour, stress and coping in adults. *Advances in Psychiatry and Neurology*, 27(3), 181–195. <https://doi.org/10.5114/ppn.2018.78712>
- Law, K. S., & Wong, C. S. (2004). The construct and criterion validity of emotional intelligence and its potential utility for management studies. *Journal of Applied Psychology*, 89(3), 483–496. <https://doi.org/10.1037/0021-9010.89.3.483>
- Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.
- Li, W. W., & Miller, D. J. (2016). The impact of coping and resilience on anxiety among older Australians. *Australian Journal of Psychology*, 69(4), 263–272. <https://doi.org/10.1111/ajpy.12152>
- Li, M. G., Chen, X., Gong, H. L., Wang, W., Ji, W. H., & Liang, S. F. (2022). Relationship between paternal adult attachment and adolescent anxiety: The chain-mediating effect of paternal psychological flexibility and father-adolescent attachment. *International Journal of Psychology*, 57(3), 411–419. <https://doi.org/10.1002/ijop.12832>
- Luthans, F., & Youssef-Morgan, C. M. (2017). Psychological capital: An evidence-based positive approach. *Annual Review of Organizational Psychology and Organizational Behavior*, 4, 339–366. <https://doi.org/10.1146/annurev-orgpsych-032516-113324>
- Ma, Y. (2014). Characteristics of left-behind junior middle school students' psychological capital and related research. *Guangxi University*. <https://kns.cnki.net/KCMS/detail/detail.aspx?dbname=CMFD201501&filename=1014370248.nh>
- Mitic, P., Nedeljkovic, J., Taksic, V., Sporis, G., Stojiljkovic, N., & Milcic, L. (2020). Sports performance as a moderator of the relationship between coping strategy and emotional intelligence. *Kinesiology*, 52(2), 281–289. <https://doi.org/10.26582/k.52.2.15>
- Moradi, A., Pishva, N., Ehsan, H. B., Hadadi, P., & Pouladi, F. (2011). The relationship between coping strategies and emotional intelligence. *Procedia - Social and Behavioral Sciences*, 30(2011), 748–751. <https://doi.org/10.1016/j.sbspro.2011.10.146>
- Noorbakhsh, S. N., Besharat, M. A., & Zarei, J. (2010). Emotional intelligence and coping styles with stress. *Procedia - Social and Behavioral Sciences*, 5(2010), 818–822. <https://doi.org/10.1016/j.sbspro.2010.07.191>
- Phillips, A. G., & Silvia, P. J. (2005). Self-awareness and the emotional consequences of self-discrepancies. *Personality and Social Psychology Bulletin*, 31(5), 703–713. <https://doi.org/10.1177/0146167204271559>
- Rabenu, E., Yaniv, E., & Elizur, D. (2017). The relationship between psychological capital, coping with stress, well-being, and performance. *Current Psychology*, 36(4), 875–887. <https://doi.org/10.1007/s12144-016-9477-4>
- Raknes, S., Pallesen, S., Himle, J. A., Bjaastad, J. F., Wergeland, G. J., Hoffart, A., Dyregrov, K., Haland, A. T., & Haugland, B. S. M. (2017). Quality of life in anxious adolescents. *Child and Adolescent Psychiatry and Mental Health*, 11, 33. <https://doi.org/10.1186/s13034-017-0173-4>
- Romano, L., Tang, X., Hietajarvi, L., Salmela-Aro, K., & Fiorilli, C. (2020). Students' trait emotional intelligence and perceived teacher emotional support in preventing burnout: The moderating role of academic anxiety. *International Journal of Environmental Research and Public Health*, 17(13), 4771. <https://doi.org/10.3390/ijerph17134771>
- Rosenthal, R., & Jacobson, L. (2003). *Pygmalion in the classroom: Teacher expectation and pupil's intellectual development* (Expanded ed.). Crown House Publishing.
- Salovey, P., & Sluyter, D. (1997). *Emotional development and emotional implication*. Basic Books.
- Sarabia-Cobo, C. M., Suarez, S. G., Crispin, E. J. M., Cobo, A. B. S., Perez, V., de Lorena, P., Rodriguez, C. R., & Gross, L. S. (2017). Emotional intelligence and coping styles: An intervention in geriatric nurses. *Applied Nursing Research*, 35, 94–98. <https://doi.org/10.1016/j.apnr.2017.03.001>
- Schutte, N. S., Malouff, J. M., Thorsteinsson, E. B., Bhullar, N., & Rooke, S. E. (2007). A meta-analytic investigation of the relationship between emotional intelligence and health. *Personality and Individual Differences*, 42(6), 921–933. <https://doi.org/10.1016/j.paid.2006.09.003>
- Shánchez-Álvarez, N., Extremera, N., & Fernández-Berrocal, P. (2016). The relation between emotional intelligence and subjective well-being: A meta-analytic investigation. *Journal of Positive Psychology*, 11(3), 276–285. <https://doi.org/10.1080/17439760.2015.1058968>
- Shen, S., Tang, T. Q., Shu, H., Wang, S. D., Guan, X. L., Yan, X. D., Wang, Y. L., Qi, Y., & Feng, R. (2022). Linking emotional intelligence to mental health in Chinese high school teachers: The mediating role of

- perceived organizational justice. *Frontiers in Psychology*, *12*, 810727. <https://doi.org/10.3389/fpsyg.2021.810727>
- Sigmon, S. T., Whitcomb-Smith, S. R., Rohan, K. J., & Kendrew, J. J. (2004). The role of anxiety level, coping styles, and cycle phase in menstrual distress. *Journal of Anxiety Disorders*, *18*(2), 177–191. [https://doi.org/10.1016/S0887-6185\(02\)00243-8](https://doi.org/10.1016/S0887-6185(02)00243-8)
- Sun, J., Liu, Q., & Yu, S. (2019). Child neglect, psychological abuse and smartphone addiction among Chinese adolescents: The roles of emotional intelligence and coping style. *Computers in Human Behavior*, *90*, 74–83. <https://doi.org/10.1016/j.chb.2018.08.032>
- Thorne, K. J., Andrews, J. J. W., & Nordstokke, D. (2013). Relations among children's coping strategies and anxiety: The mediating role of coping efficacy. *Journal of General Psychology*, *140*(3), 204–223. <https://doi.org/10.1080/00221309.2013.792235>
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, *5*(2), 207–232. [https://doi.org/10.1016/0010-0285\(73\)90033-9](https://doi.org/10.1016/0010-0285(73)90033-9)
- Uhls, Y. T., Michikyan, M., Morris, J., Garcia, D., Small, G. W., Zgourou, E., & Greenfield, P. M. (2014). Five days at outdoor education camp without screens improves preteen skills with nonverbal emotion cues. *Computers in Human Behavior*, *39*, 387–392. <https://doi.org/10.1016/j.chb.2014.05.036>
- Wang, K., Su, L., Zhu, Y., Zhai, J., Yang, Z., & Zhang, J. (2002). Norms of the screen for child anxiety related emotional disorders in Chinese urban children. *Chinese Journal of Clinical Psychology*, *04*(4): 270–272. <https://kns.cnki.net/kcms/detail/detail.aspx?FileName=ZLCY200204008&DbName=CJFQ2002>
- World Health Organization. (2022, August 21). *COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide*. <https://www.who.int/news/item/02-03-2022-covid-19-pandemic-triggers-25-increase-in-prevalence-of-anxiety-and-depression-worldwide>
- Wu, S., Xu, Z., Zhang, Y., & Liu, X. (2020). Relationship among psychological capital, coping style and anxiety of Chinese college students. *Rivista Di Psichiatria*, *54*(6), 264–268. <https://doi.org/10.1708/3281.32545>
- Xie, J., Yao, T., Yang, X., Huang, R., & Yang, H. (2015). The relationship between coping style and academic achievement among junior school freshmen. *Service Science and Management*, *4*(2), 7–12. <https://doi.org/10.12677/SSEM.2015.42002>
- Xiong, J. M., Hai, M., Wang, J. T., Li, Y., & Jiang, G. R. (2020). Cumulative risk and mental health in Chinese adolescents: The moderating role of psychological capital. *School Psychology International*, *41*(5), 409–429. <https://doi.org/10.1177/0143034320934524>
- Ye, L., Posada, A., & Liu, Y. (2019). A review on the relationship between Chinese adolescents' stress and academic achievement. *New Directions for Child and Adolescent Development*, *163*, 81–95. <https://doi.org/10.1002/cad.20265>
- Zheng, Z., Han, W. Y., Zhou, Y., & Zhang, N. (2020). Childhood maltreatment and depression in adulthood in Chinese female college students: The mediating effect of coping style. *Frontiers in Psychiatry*, *11*, 581564. <https://doi.org/10.3389/fpsyg.2020.581564>
- Zhu, X., Haegele, J.A., Liu, H., & Yu, F. (2021). Academic stress, physical activity, sleep, and mental health among Chinese adolescents. *International Journal of Environmental Research and Public Health*, *18*(14), 7257. <https://doi.org/10.3390/ijerph18147257>
- Zhu, Z. M., Sang, B. A., Chen, W. F., & Liu, J. S. (2022). Coping style mediates the relationship between psychological capital and depression among senior high school students. *Social Behavior and Personality*, *50*(3), 112–122. <https://doi.org/10.2224/sbp.11224>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.