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ORIGINAL RESEARCH

Longitudinal Relationship Between Psychological Capital and Anxiety in College Students: The Mediating Effect of Emotion Reregulation Strategy and Moderating Effect of Parent-Child Relationship

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Objective: Based on Conservation of resources theory, process model of emotion regulation and attachment theory, the present study examined how psychological capital affects anxiety through the mediation of emotion regulation strategies and explored the moderating role of parent-child relationship.

Methods: Using a longitudinal study method, 962 college students were surveyed twice at one-year intervals.

Results: (1) College students' emotion regulation strategies (including cognitive reappraisal and expressive suppression) partially mediated psychological capital and anxiety mood; (2) parent-child relationship moderated the pathways of psychological capital and expressive suppression on anxiety, respectively.

Conclusion: College students with higher levels of parent-child relationship had stronger predictive effects of psychological capital and weaker predictive effects of expressive suppression on anxiety mood. The research findings clarify the combined effects of emotion regulation and parent-child relationships on anxiety among college students, providing valuable reference for the design and implementation of interventions to promote individual psychological well-being.

Keywords: psychological capital, emotion regulation strategies, anxiety, parent-child relationship

Introduction

Anxiety is a common psychological problem plaguing college student.[1] With the transformation and change of society and the increase of pressure, both state anxiety level and trait anxiety level of college students increase year by year with the increment of age.[2] College students are at a crucial transitional period towards adulthood, facing various pressures such as academic pursuits, employment, personal development, and social integration, making them more susceptible to mental health issues.[3] Therefore, it is of great practical significance to pay attention to the generation and influence mechanism of college students' anxiety, to provide a basis for preventing its occurrence and development and to promote the psychological health of college students.

Psychological Capital and Anxiety

Psychological capital is a rich and positive state of mind that an individual exhibits as he or she grows up[4] and is an important predictor of adolescent mental health.[5,6] Studies had shown that psychological capital positively predicted subjective well-being[7] and negatively predicts anxiety/depression.[8] Conservation of resources theory (COR) suggests that

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individuals tend to expect to acquire, maintain, and create resources that are conducive to their survival based on human self-preservation mechanisms. Thus, resource depletion is considered to be a major source of stress, and individuals will actively build resources in order to successfully prevent and cope with real or potential stresses and threats.[9] The most critical of these are stable personality traits (eg optimism, self-efficacy, emotion regulation, etc) that are inherent in the individual's ability to manage and utilize his/her resources in a positive and productive way, which are important resources for coping with environmental stresses and threats,[10] and which can have a long-lasting and far-reaching impact on the individual.[11] Accordingly, as a key resource, the influence of psychological capital on anxiety may be mediated through the regulation and management of an individual's resources,[12] but there is a lack of research exploring exactly what variables may play a role between this.

Psychological Capital and Emotion Regulation Strategy

Psychological capital consists of four core components: resilience, optimism, hope, and self-efficacy.[13,14] Resilience refers to an individual's mental ability to quickly adjust and recover from adversity, failure, and setbacks; optimism refers to an individual's positive attitudes and attributions about real and future objective events; hope refers to an individual's mental state of adjusting his/her cognitive pathways to achieve the needs of a goal; and self-efficacy refers to an individual's sense of competence to challenge a goal and be confident of success.[15] These processes reflect to some extent how emotion regulation strategies are handled.[10]

Emotion regulation strategies refer to the process by which an individual exerts influence over the occurrence, experience, and expression of emotions,[16] and is one of the avenues in which individuals cope with negative emotions. The process model of emotion regulation,[17] which categorizes individual emotion regulation into first-focused and response-oriented strategies based on the temporal sequence in which it occurs. Among them, cognitive reappraisal and expressive suppression are the most common and effective prior-focused and response-oriented strategies, respectively. Specifically, cognitive reappraisal refers to an individual's change in perception of an emotional event, which reduces negative emotions and increases the expression of positive emotions, thereby slowing down negative emotions; and expression suppression refers to an individual's suppression of persistent emotional expression behavior, including both negative and positive emotions.[18] Research has shown that distress from depression and anxiety symptoms can be reduced by sharing positive emotions and deflecting negative emotions; whereas deliberate suppression of positive emotions or repeated thoughts about negative emotions can increase depression and anxiety symptoms.[19] Additionally, research has found that individuals with high levels of psychological capital are more likely to reassess negative or stressful situations[20] and are less likely to engage in negative coping, which indirectly affects one's level of psychological distress.[21] Moreover, self-efficacy and perceived stress have bidirectional reduction effects.[22] Based on this, the present study proposes Hypothesis H1 that high levels of psychological capital among college students will indirectly alleviate anxiety by increasing the use of positive emotion regulation strategies (cognitive reappraisal) and decreasing the use of negative emotion regulation strategies (expressive suppression), ie, there is a mediating effect of emotion regulation strategies between psychological capital and college students' anxiety.

Emotion Regulation Strategy and Parent-Child Relationship

According to the Attachment Theory,[23] early patterns of interpersonal relationships have a profound effect on the development of behavior in adulthood. Attachment behaviors can be reinforced by interactions with primary caregivers (ie, parents), who contribute most to the formation of adolescents' psychological structures that provide stable representations of self, others, and the environment.[24] Parent-child relationship performance is closely related to children's emotional development, influencing how adolescents learn to regulate their internal emotions and their emotional expression. Many studies supported this theory and suggested that securely attached children show better emotion regulation, greater stability, and higher levels of psychological well-being than children with anxious-avoidant attachment.[25] Although adolescents' attachment to their parents changes as they become less dependent on their parents compared to childhood, research had found substantial associations between adolescent attachment and a variety of developmental problems.[26] High-quality parent-child attachment can help adolescents better understand themselves and may enhance emotion regulation.[27] It has been found that when adolescents are faced with emotional problems in

a positive and warm family atmosphere and a high-quality parent-child relationship, they prioritize positive emotion regulation strategies, which can lead to a good state of stable emotional development. Adolescents' ability to regulate their emotions can be most directly affected by parent-child attachment and can also be indirectly improved through the correct use of emotion regulation strategies.[28] Therefore, given the important influence of parent-child relationship on emotion regulation, it is possible that they may also play a role in how different emotion regulation strategies affect college students' anxiety, but the exact mode of action is not yet known. Based on this, the present study proposes hypothesis H2 that college students' parent-child relationship has a moderating role in the mediation model of psychological capital affecting college students' anxiety through emotion regulation strategies.

On the other hand, the Conservation of Resources theory posits that individuals have a fundamental motivation to acquire and maintain resources,[9] with threats of resource loss, lack, and depletion leading to stress and mental health issues for the resource holder.[11] It suggests that just like the concept of "resource caravans", resources do not exist in isolation but travel together, with increases or decreases in certain resources in the resource pool leading to synergistic changes in other resources.[9] Specifically in this study, a strong parent-child relationship, as a crucial family protective resource, provides college students with a solid early resource reserve, enabling them to enhance their ability to maintain their existing resources and develop other resources (such as optimism, hope, and other psychological capital);[29] And this positive psychological capital can trigger positive emotional states in individuals, thus optimizing their mental health and reducing the generation of negative emotions such as depression and anxiety;[30] when individuals are exposed from a young age to environments with poor parent-child attachment quality, frequent parent-child conflicts, and lack of resources, it weakens their ability to preserve existing resources and develop other resources, leading to more depression and negative emotions. Therefore, the level of psychological capital may be moderated by parent-child relationships in its impact on anxiety among college students. In conclusion, this study hypothesizes that H3: College students' parent-child relationships have a moderating effect on the direct path of psychological capital's impact on college students' anxiety.

Although some studies have examined the relationship between psychological capital, emotional regulation strategies, and anxiety, there is still a lack of longitudinal research data on its dynamic relationship.[31–33] In summary, based on Conservation of resources theory, process model of emotion regulation and attachment theory, a longitudinal design was used to conduct two questionnaire surveys on Chinese adolescents, and a moderated mediation model was constructed to systematically examine the effects of psychological capital and emotional regulation strategies on college students' anxiety, as well as the moderating role of parent-child relationships. The model hypothesis is shown in Figure 1. This study not only can further clarify the relationship and the inherent mechanism of psychological capital, parent-child relationship, and college students' mental health but also the findings can be used in practice teaching to help educators prevent and intervene in college students' mental health problems.

Methods

Participants

Using cluster random sampling, 20 classes were randomly selected from two comprehensive universities in Mainland China to balance expertise and gender for questionnaire surveys. Data collection was conducted through two questionnaire surveys. To explore the longitudinal predictive relationships between variables, the first questionnaire survey

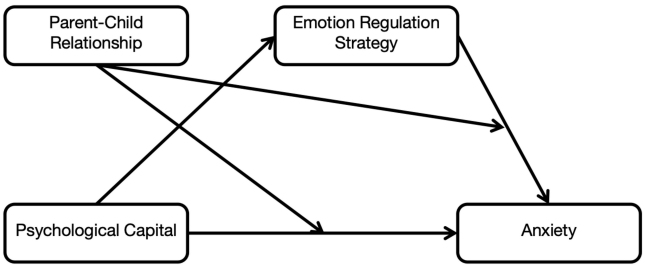

Figure 1 Hypothesis Diagram of Moderated Mediation Model.

was conducted in October 2021, obtaining 1000 valid questionnaires, measuring college students' psychological capital, emotion regulation strategies, and demographic information (age, gender); one year later, the same group of college students was followed up through student ID numbers for the second questionnaire survey, measuring college students' parent-child relationships and anxiety levels. Due to busy academic schedules, some Participants were missing. After deleting 48 invalid questionnaires with too many blanks and incomplete matches, a total of 962 valid questionnaires were obtained, for a loss rate of 4.8%. The results of the *t*-test showed that sample loss in terms of measured variables followed randomness. The 962 adolescents who provided valid questionnaires for both surveys were the participants, including 494 males and 468 females; 328 in science, 356 in humanities, and 278 in engineering; 483 freshmen, 228 sophomores, and 251 juniors; with an average age of 19.865 years (*SD* = 0.926).

Measurement

Psychological Capital

The Positive Psychological Capital Questionnaire (PPQ) was used for the Measurement.[34] The PPQ consists of 26 questions measuring (eg, "I always see the bright side of things"), hope (eg, "I confidently pursue my goals"), self-efficacy (eg, "I consistently perform tasks effectively"), and resilience (eg, "I quickly recover from setbacks"). A 7-point scale was used, with 1 being "not at all" and 7 being "completely". The average score of all items was calculated, with higher scores indicating higher individual psychological capital. In this study, the Cronbach's α coefficients of optimism, hope, self-efficacy, and resilience dimensions were 0.865, 0.844, 0.836, and 0.823, respectively, and the Cronbach's α coefficient of the total questionnaire was 0.869.

Emotion Regulation Strategies

The Chinese version of the revised Adolescent Emotion Regulation Questionnaire (AERQ) was used for the survey.[35] The questionnaire consists of 10 questions with two subscales: cognitive reappraisal (eg, "I will change the way I think about problems to regulate my emotions") and expressive suppression (eg, "When feeling afraid, I will not let my emotions show"). The questionnaire is scored on a 7-point scale, with 1 indicating "totally disagree" and 7 indicating "totally agree", with higher scores indicating higher levels of emotion regulation. In this study, the Cronbach's α coefficients for the subscales were 0.792 and 0.856, respectively.

Anxiety

The Anxiety subscale of the Depression and Anxiety Stress Scale (DASS) (e.g., "I find it hard to quiet down myself", "I feel parched") was used for the measurement.[36] The subscale consists of 7 questions and is scored on a 4-point scale ranging from 1-4 on a scale from "does not meet" to "always meets". The items of the anxiety subscale are added together to form an anxiety score, with higher scores indicating higher levels of anxiety. In this study, the Cronbach's α coefficient for this scale was 0.826.

Parent-Child Relationship

The Parent-Child Relationship Scale was used for the survey.[37,38] The scale consists of two subscales: father-child relationship and mother-child relationship (eg, "Do you hope for any changes in your father (mother)", and each subscale has the same nine questions. The scale scored on a scale of 1–5 from "not at all" to "very much". The total mean score was used as the final score, with higher scores indicating better father-child and mother-child relationships. The Cronbach's α coefficients were 0. 941 and 0.902 in this study, respectively.

Measurement Procedures and Data Analysis

After obtaining the informed consent of the school director and the students themselves, the test was administered collectively in a classroom setting, with a specially trained postgraduate student as the main examiner. After the test leader explained the instructions and helped the participants to understand the requirements and rules of answering the questions, the students completed all the questions independently without interfering with each other in answering the questions. It took about 20 minutes to complete all the questions, and all the questionnaires were distributed and collected on the spot. After excluding invalid questionnaires, SPSS 22.0 software was used to conduct a layer-by-layer regression

to test for moderated mediation effects, and Model 59 (http://www.Afhayes.com/) in the PROCESS programmer plug-in developed by Hayes (2013) was used to test for specific moderated and mediated effects.[39]

Results

Common Method Bias Test

The common method bias test was conducted using the Harman one-way method. The Results of exploratory factor analysis showed that the explained rate of the first common factor analyzed was 18.156%, which was less than the 40% critical value.[40] What's more, a validated factor analysis of the one-way model for all measures showed that the fit indices were unsatisfactory, χ^2/df = 5.534, *CFI* = 0.354, *TLI* = 0.340, *RMSEA* = 0. 076, and *SRMR* = 0.083. Therefore, there was no serious common method bias in this study.[41]

Descriptive Statistics and Correlation Analysis

There was a significant correlation between the study variables. The means, standard deviations and correlation coefficients of the measured variables are shown in Table 1.

Testing the Moderated Mediation Model

According to the moderated mediation test proposed by Zhonglin Wen and Baojuan Ye (2014),[42] the relationship between psychological capital and college students' anxiety was examined, as well as the mediating effect of two emotion regulation strategies in the above relationship and the moderating effect of parent-child relationship. All variables were standardized and then tested against three regression equations.

Psychological capital in equation 1 negatively predicted college students' anxiety ($\beta = -0.444$, $p < 0.001$), and parent-child relationship negatively predicted anxiety ($\beta = -0.303$, $p < 0.001$); The results of the model with cognitive reappraisal as a mediating variable showed that psychological capital in equation 2 positively predicted cognitive reappraisal ($\beta = 0.557$, $p < 0.001$); psychological capital ($\beta = -0.351$, $p < 0.001$), and parent-child relationship ($\beta = -0.304$, $p < 0.001$) were significant predictors of anxiety in equation 3, and the interaction term between psychological capital and parent-child relationship ($\beta = -0.093$, $p < 0.001$), and cognitive reappraisal ($\beta = -0.170$, $p < 0.001$) were also significant predictors for anxiety. While the interaction term between cognitive reappraisal and parent-child relationship was not significant in predicting anxiety ($\beta = 0.043$, $p > 0.05$) (See Table 2).

The results of the model with expression suppression as a mediating variable showed that psychological capital positively predicted expression suppression in equation 2 ($\beta = -0.660$, $p < 0.001$); psychological capital ($\beta = -0.328$, $p < 0.001$), parent-child relationship ($\beta = -0.314$, $p < 0.001$) were all significant predictors of anxiety in equation 3. Moreover, the interaction between psychological capital and parent-child relationship term was significant in predicting anxiety ($\beta = -0.138$, $p < 0.001$). Expression suppression ($\beta = 0.168$, $p < 0.001$), and the interaction term between expression inhibition and parent-child relationship ($\beta = -0.095$, $p < 0.001$) were all significant predictors of anxiety (See Table 3).

In summary, this moderated mediation analysis results show that cognitive reappraisal and expressive suppression mediate the relationship between psychological capital and anxiety among university students. The mediating effect of cognitive reappraisal is −0.111, with a 95% confidence interval of [−0.161, −0.065]. Parental relationships moderate the direct path of psychological capital to anxiety in this mediation model. While the mediating effect of expressive

Table 1 Descriptive Statistics and Correlations for Study Variables (*r*, *n*=962)

Variables	*M*	*SD*	1	2	3	4	5
1 Psychological Capital	4.767	0.678	1				
2 Cognitive Reappraisal	4.781	0.812	0.554**	1			
3 Expressive Suppression	2.269	1.105	−0.665**	−0.677**	1		
4 Anxiety	2.307	0.302	−0.591**	−0.436**	0.485**	1	
5 Parent-Child Relationship	3.071	0.738	0.458**	0.246**	−0.311**	−0.513**	1

Note: **$p < 0.01$.

Table 2 Moderated Mediating Model Test of Cognitive Reappraisal

Regression	Equation 1(Anxiety)			Equation 2(Cognitive Reappraisal)			Equation 3(Anxiety)		
	β	*SE*	*95% CI*	*β*	*SE*	*95% CI*	*β*	*SE*	*95% CI*
Psychological Capital	−0.444***	0.028	[−0.498, −0.389]	0.557***	0.030	[0.497, 0.616]	−0.351***	0.032	[−0.414, −0.289]
Parent-Child Relationship	−0.303***	0.030	[−0.071, 0.048]	−0.011	0.030	[−0.071, 0.048]	−0.304***	0.027	[−0.357, −0.251]
Psychological Capital × Parent-Child Relationship	−0.077***	0.022	[−0.121, −0.034]	0.023	0.025	[−0.025, 0.071]	−0.093***	0.025	[−0.142, −0.043]
Cognitive Reappraisal							−0.169***	0.030	[−0.229, −0.110]
Cognitive Reappraisal × Parent-Child Relationship							0.043	0.028	[−0.012, 0.097]
R^2	0.431***			0.308***			0.449***		
F	241.943***			142.044***			156.014***		

Note: Variables in regression models are standardized. ***$p < 0.001$.

Table 3 Moderated Mediating Model Test of Expression Suppression

Regression	Equation 1(Anxiety)			Equation 2(Expression Suppression)			Equation 3(Anxiety)		
	β	*SE*	*95% CI*	*β*	*SE*	*95% CI*	*β*	*SE*	*95% CI*
Psychological Capital	−0.444***	0.028	[−0.498, −0.389]	−0.660***	0.027	[−0.714, 0.607]	−0.328***	0.035	[−0.396, −0.260]
Parent-Child Relationship	−0.303***	0.030	[−0.071, 0.048]	−0.008	0.027	[−0.062, 0.045]	0.168***	0.032	[0.105, 0.231]
Psychological Capital× Parent-Child Relationship	−0.077***	0.022	[−0.121, −0.034]	−0.007	0.022	[−0.049, 0.036]	−0.138***	0.029	[−0.194, −0.082]
Expression Suppression							−0.314***	0.027	[−0.367, −0.261]
Expression Suppression× Parent-Child Relationship							−0.095***	0.029	[−0.151, −0.039]
R^2	0.431***			0.442***			0.452***		
F	241.943***			253.137***			157.397***		

Notes: Variables in regression models are standardized. ***$p < 0.001$.

suppression is −0.094, with a 95% confidence interval of [−0.135, −0.057]. Parental relationships moderate both the direct path of psychological capital to anxiety and the latter half of the path mediated by expressive suppression. Hypotheses H1 and H2 are confirmed.

To explain the moderated mediation model more clearly, the parent-child relationship was divided into two groups of high and low according to one standard deviation of positive and negative, and the predictive role of psychological capital on college students' anxiety at different levels of parent-child relationship was further examined by simple slope analysis. The results of the model with cognitive reappraisal as the mediating variable indicated that the relationship of psychological capital on college students' anxiety was elevated as the level of parent-child relationship increased (from $B_{simple} = -0.259$, $t = -6.111$, $p < 0.001$ to $B_{simple} = -0.444$, $t = -11.544$, $p < 0.001$), ie, higher levels of parent-child relationship enhanced the predictive effect of psychological capital on anxiety (Figure 2).

The results of the model with expression suppression as a mediating variable indicated that the relationship of psychological capital on college students' anxiety elevated as the level of parent-child relationship increased (from $B_{simple} = -0.190$, $t = -4.051$, $p < 0.001$ to $B_{simple} = -0.466$, $t = -10.958$, $p < 0.001$), ie, higher parent-child relationship enhanced the predictive effect of psychological capital on anxiety (Figure 3). Meanwhile, the predictive effect of expression suppression on anxiety was further examined by simple slope analysis at different levels of parent-child relationship. The results showed that the effect of expression suppression on anxiety was attenuated and shifted to non-significant (from $B_{simple} = 0.263$, $t = 5.877$, $p < 0.001$ to $B_{simple} = 0.073$, $t = 1.768$, $p > 0.05$) with increasing levels of parent-child relationship, ie, higher parent-child relationship alleviated the predictive effect (Figure 4). The results in Tables 4 and 5 further indicate that the mediating effects

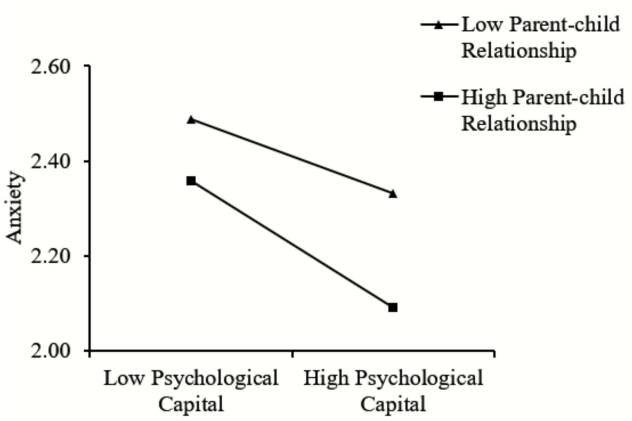

Figure 2 Moderating the Role of Parent-Child Relationship in the Relationship between Psychological Capital and Anxiety (Cognitive Reappraisal mediating).

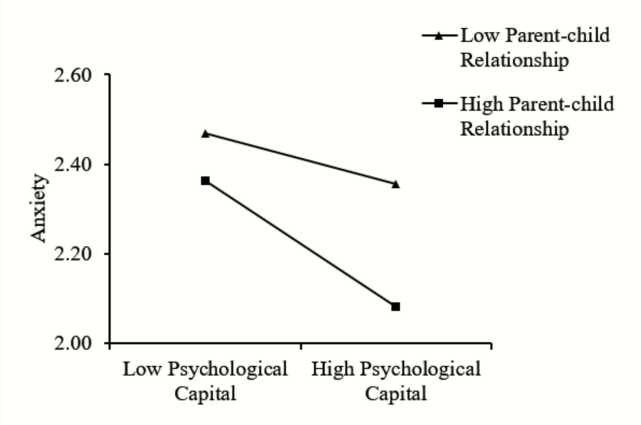

Figure 3 Moderating the Role of Parent-Child Relationship in the Relationship between Psychological Capital and Anxiety (Expression Suppression mediating).

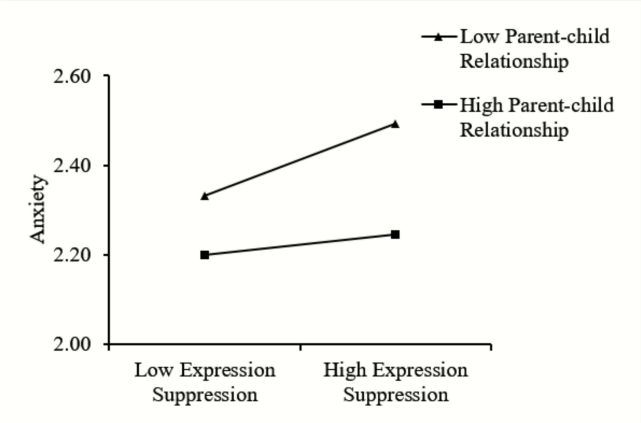

Figure 4 Moderating the Role of Parent-Child Relationship in the Relationship between Expression Suppression and Anxiety.

of two emotion regulation strategies, cognitive reappraisal, and expression suppression, on college students' anxiety are moderated by the parent-child relationship, as evidenced by a significant weakening of the mediating effects of the emotion regulation strategies as the level of the parent-child relationship increases.

Table 4 Mediating Effects of Cognitive Reappraisal at Different Parent-Child Relationship

Parent-child Relationship	Indirect	Boot standard	Boot CI lower	Boot CI Upper
−1 (*M* - *SD*)	−0.113	0.029	−0.170	−0.056
0	−0.094	0.020	−0.134	−0.057
1 (*M* + *SD*)	−0.074	0.029	−0.135	−0.017

Table 5 Mediating Effects of Expression Repression at Different Parentage Levels

Parent-child Relationship	Indirect	Boot standard	Boot CI lower	Boot CI Upper
−1 (*M* - *SD*)	−0.172	0.033	−0.241	−0.110
0	−0.111	0.024	−0.161	−0.065
1 (*M* + *SD*)	−0.049	0.036	−0.123	0.019

Discussions

In this study, a moderated mediation model was constructed to analyze the relationship between psychological capital and college students' anxiety and its mechanism. On the one hand, it clarifies how psychological capital works, that is, the mediating effect of emotion regulation strategies on adolescent anxiety. On the other hand, the relationship between psychological capital and anxiety is moderated by parent-child relationship, and with the increase of parent-child relationship, the predictive effect of psychological capital on anxiety is enhanced, while the predictive effect of expression inhibition on anxiety is weakened. The results of this study have important theoretical significance and practical value for the scientific prevention and intervention of college students' anxiety.

Mediating Role of Emotion Regulation Strategies

This study showed that college students' psychological capital would alleviate anxiety by increasing cognitive reappraisal and decreasing expressive suppression. This result supports the process model of emotion regulation,[17] ie, positive prior-focused strategies contribute to an individual's psychological well-being, whereas negative response-oriented strategies increase psychological distress.[19] Individuals' regulation of emotions through cognitive reappraisal alters the entire trajectory of emotional responses, decreasing the psychological experience, behavioral expression, and physiological responses to emotions.[43] Emotion regulation involves different aspects of contextual choice, cognitive change, and response adjustment, with expression suppression occurring primarily in the response adjustment component, thus playing a role in the allocation of attentional resources and negative appraisal judgments in the cognitive-behavioral process of social anxiety, which affects the production and intensity of anxiety.[44]

The individuals with high levels of psychological capital have strong internal motivation and self-efficacy, are willing to challenge high goals, show high cognitive flexibility in stressful situations, and can proactively adjust cognitive resources to the current situation, and are more likely to have positive emotional experiences,[30,45] which reflects individuals' regulation of their own state using cognitive reappraisal strategies. Positive emotions are an energy resource for individuals and can positively contribute to their cognitive and behavioral development,[30] which in turn alleviates an individual's anxiety. On the other hand, lower levels of psychological capital also decrease the use of cognitive reappraisal and increase the use of expression suppression thereby increasing anxiety. The result of these two responses ie, the use of suppression and restraint to deal with one's negative emotions can trigger a challenge to emotional security. Emotional security theory states that when emotional security is continually challenged, it tends to lead to continued emotional dysregulation, increasing the risk of anxiety in college students.[46] Therefore, psychological capital, a key

resource for individuals in COR theory, contributes positively to constructive resources[9,11] that can increase the ability of college students to regulate their positive emotions and thus improve their mental health.

The Moderating Role of the Parent-Child Relationship

Model integration indicated that there was a moderating effect of the parent-child relationship on the pathways of psychological capital and expressive suppression on anxiety, respectively, and a non-significant effect between the relationship between psychological capital and cognitive reappraisal on depression. This was demonstrated by an overall decrease in anxiety levels as the level of parent-child relationship increased, an increase in the predictive effect of psychological capital on anxiety and a decrease in the predictive effect of expressive suppression on anxiety. Consistent with the results of existing studies, the parent-child relationship, as a product of the interaction between the child and the microenvironment of the family, interacts with the child's individual factors to determine the child's mental health status.[47] College students with good parent-child relationships usually have positive beliefs about the present and the future because they feel loved and cared for by their parents;[48] they receive effective support and care from their parents in times of difficulty, which promotes the degree of perseverance and effort in the face of difficulty and adversity, and ultimately, the individual develops well in stressful situations,[49] and, as a result, their psychological capital is more capable of regulating and managing anxiety.

Alternatively, college students who perceive a good parent-child relationship are more likely to draw psychological energy from parent-child communication, which in turn helps them to set specific, clear goals and be willing to work towards them, as well as have greater problem-solving abilities,[50] thus mitigating the worsening of college students' anxiety by the expression suppression of negative emotion regulation strategies. In other words, the parent-child relationship plays a model of influence that enhances the positive effects and mitigates the negative effects in the relationship between psychological capital, emotion regulation strategies, and anxiety among college students. This is consistent with the basic tenets of Positive Development of Resources Theory and Relational Development Systems Theory, which speculate that external positive resources for individuals promote the generation of internal resources, and the accumulation of both internal and external resources collectively enhances psychological well-being.[51,52] In other words, high-quality parent-child relationships, as positive external resources for children, not only directly promote their healthy development but also indirectly facilitate their healthy growth by influencing the construction of their internal psychological resources, thereby reducing the occurrence of anxiety.

In addition, the results of the present study indicated that the mediating effects of both emotion regulation strategies, cognitive reappraisal, and expressive suppression significantly diminished as the level of parent-child relationship increased, ie, at this point in time, college students' level of psychological capital was a better predictor of their anxiety. As has been shown, family is an important factor influencing psychological capital.[53] Consequently, a good parent-child relationship can promote the development of positive qualities such as hope and optimism in students, which in turn can make their psychological capital work better, thus promoting their ability to solve problems properly in life and learning, and building good interpersonal relationships with people around them, forming a virtuous circle and helping to alleviate their anxiety.[54] However, incorrect communication between parents and children and overly strict parenting styles can lead to the formation of timid, low self-esteem and extreme personalities, and the application of the rules of engagement learnt by their children in the family to their learning and life, even if their psychological capital is strengthened, they are prone to develop emotional maladaptation.[55]

Significance and Shortcomings of the Study

This study has important theoretical and practical significance for the development of interventions to alleviate college students' anxiety. Theoretically, it enriches the complex mechanism of psychological capital management of individual emotion regulation in the existing COR theory, and instead, it provides a theoretical basis and a new perspective for interventions to give full play to the facilitating role of parent-child relationship and positive emotion regulation strategies in alleviating individual emotional maladjustment in the practice of real mental health education. Psychological capital can indirectly play a role in college students' anxiety through different emotion regulation strategies, while parent-child relationship can modulate the predictive role of psychological

capital and negative emotion regulation strategies expression suppression on anxiety. This also advocates that educator should pay attention to the development of positive emotion regulation strategies among college students and enhance individual psychological capital to alleviate the effects of negative emotion regulation strategies on anxiety; furthermore, parents should pay attention to the establishment of a good parent-child relationship and give full play to the positive facilitating and risk-protecting effects of the family system in the development of anxiety.

The main shortcomings or limitations of this study are as follows. First, causality (enhancing parent-child relationship will enhance the positive impact of psychological capital on college students' anxiety and reduce the negative effect of expression inhibition on anxiety, thereby having a protective effect on individual emotional adaptation problems) cannot be demonstrated in our current study design. Future studies can re-examine the results of this study using experimental Methods or group interventions. Second, the variables in this study were self-reported. Future research could use multiple methods (eg, self-report, parent report, teacher assessment) simultaneously to measure the main variables of this study. In addition, the sample of this study was college students from a specific province, which may affect the generalizability of the results. Future researchers could select college students from different regions to further test the main results of this study.

Conclusions

The main purpose of this study was to analyze the mediating role of emotion regulation strategies in the relationship between psychological capital and anxiety in college students, knowing more about the moderating effect of parent-child relationship among the mediation model. The study results show that the psychological capital of college students alleviated anxiety by increasing cognitive reappraisal and reducing expression suppression. In addition, parent-child relationship moderated the effects of psychological capital and expression suppression on anxiety, but had no significant effect on the relationship between psychological capital, cognitive reappraisal and anxiety. Specifically, with the improvement of the level of parent-child relationship, the overall level of anxiety decreased, the predictive effect of psychological capital on anxiety was enhanced, and the predictive effect of expression suppression on anxiety was weakened.

Data Sharing Statement

The authors confirm that the data supporting the findings of this study are available if request.

IRB Number of the Ethical Committee

The questionnaire and methodology for this study complied with the Declaration of Helsinki and was approved by the Human Research Ethics committee of the Kunming Medical University (Ethics approval number: YNJS-20220630-021), Written informed consent for publication was obtained from all participants.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors report there are no competing interests to declare in this work.

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