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Parental Psychological Control and Adolescent Anxiety in China: A Chain Mediation Model of Basic Psychological Needs and Self-Compassion

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ABSTRACT: Background: In adolescence, anxiety symptoms are a common mental health problem. The purpose of this study was to evaluate the possible chain-mediating functions of fundamental psychological needs satisfaction and self-compassion in the link between adolescent anxiety and parental psychological control. **Methods:** Convenience sampling was used to pick 8342 middle school pupils from the Chinese regions of Sichuan and Hebei for this cross-sectional study. Participants filled out validated measures of anxiety symptoms, self-compassion, fundamental psychological needs satisfaction, and parental psychological control. To test the suggested chain mediation model, data were examined using descriptive statistics, correlation analysis, and structural equation modeling (using Mplus). **Results:** Anxiety symptoms were significantly predicted by parental psychological control ($\beta = 0.192, p < 0.001$). This link was significantly mediated by meeting basic psychological requirements ($\beta = 0.136, 95\% \text{ CI } [0.116, 0.156]$), which accounted for 36.86% of the total effect. A significant chain mediation pathway was found ($\beta = 0.040, 95\% \text{ CI } [0.025, 0.055]$), suggesting that parental psychological control increased anxiety by first undermining basic psychological needs, which in turn decreased self-compassion, even though self-compassion did not directly mediate the relationship. **Conclusion:** This study demonstrates that adolescent anxiety is directly predicted by parental psychological control and, more importantly, that this control is exerted through a major chain mediation pathway: by weakening basic psychological needs, which in turn diminishes self-compassion and exacerbates anxiety symptoms.

KEYWORDS: Parental psychological control; self-compassion; anxiety; basic psychological needs satisfaction

1 Introduction

Anxiety disorders are among the most common and crippling illnesses in this age range, making adolescent mental health an urgent global concern [1,2]. Excessive dread and anxiety, together with related behavioral abnormalities (such as restlessness and social disengagement), are the hallmarks of anxiety disorders. Anxiety symptoms must be severe enough to cause substantial distress or interfere with key aspects of functioning in one's personal, familial, social, academic, or professional life in order to be categorized as a disorder [1]. Anxiety symptoms affect around 15.7% of children and adolescents globally, according to a meta-analysis [3]. In a similar vein, 31.9% of American teenagers suffer from anxiety symptoms, according to the National Institute of Mental Health [2]. Accordingly, a meta-analysis aimed at Chinese students also found that 26% of people have anxiety symptoms [4]. These data underscore that anxiety is a significant mental health challenge among adolescents and poses serious threats to adolescents'

current and future physical and mental well-being. The World Health Organization has identified depression and anxiety as the leading causes of illness and disability among adolescents [1]. While severe and chronic anxiety is strongly associated with a number of negative outcomes, such as poor sleep quality [5], poor academic performance [6], and reduced cognitive functioning (e.g., lower memory) [7], moderate anxiety may help with adaptation and motivation to some extent [8]. Notably, anxiety during adolescence frequently shows high stability if prompt help is not given [9], greatly raising the likelihood of developing anxiety disorders, depression, and other mental health problems in adulthood [10]. Alarming, many anxious adolescents worldwide still lack adequate professional support [11]. Therefore, identifying the causal mechanisms underlying anxiety symptoms to develop appropriate interventions has become an important and urgent topic in psychology and education, with significant theoretical and practical implications for promoting adolescent mental health.

One important contextual factor that affects teenagers' mental health is their family. Parental psychological control refers to overbearing parenting that compromises teenage autonomy by manipulating, withdrawing love, and instilling guilt [12]. According to research, parents who practice parental psychological control frequently disregard their children's emotional and autonomy requirements, which thwarts fundamental psychological demands like relatedness, competence, and autonomy [13]. This can trigger emotional dysregulation that manifests as persistent anxiety [14], significantly increasing adolescents' risk of developing anxiety symptoms. However, the specific internal psychological processes underlying this relationship, and whether key mediating pathways exist, remain to be explored. Accordingly, this study constructed a chain mediation model to examine, among Chinese adolescents, the mediating roles of the satisfaction of adolescents' basic psychological needs and their self-compassion in the relationship between parental psychological control and anxiety symptoms. The purpose of this study was to ascertain whether adolescents' basic psychological needs are compromised by parental psychological control, which would impair their capacity for self-compassion and worsen their anxiety symptoms. In addition to offering fresh empirical evidence for the combined application of self-determination and self-compassion theory, this model expands our knowledge of the relationships among parenting styles, fundamental psychological needs, and constructive psychological resources. This investigation provides scientific proof as well as useful strategies for treating and preventing teenage anxiety.

1.1 Parental Psychological Control and Anxiety in Adolescents

In order to limit a child's autonomy and enforce conformity, parental psychological control is a negative parenting style that is typified by intrusive tactics such as emotional neglect, guilt induction, and loss of affection. Individual development results from ongoing interactions with the environment, according to ecological systems theory [15]. Parental psychological control is a negative environmental influence in this situation. It not only prevents teenagers from developing and meeting their requirements for autonomy, competence, and relatedness [16], but it also causes emotional regulation skills to deteriorate and negative self-schemas to build, which greatly raises the risk of anxiety. According to the socio-ecological model of chronic stress, parental psychological control is a persistent stressor that can activate adolescents' cognitive vulnerabilities, increasing the likelihood that they will adopt negative cognitive patterns in response to stress, which will ultimately lead to maladaptive reactions like anxiety [17]. Parental psychological control and teenage anxiety have been shown to be positively correlated in empirical study, with strong predictive value for the development of anxiety. An increase in anxiety levels from childhood to adolescence was significantly predicted by parental psychological control, according to a longitudinal research by Chyung et al. [18]. Zhao et al. [19] showed a cross-temporal predictive effect of parental psychological control on anxiety among teenagers aged 12–15 in China, confirming this conclusion. The effects of parental

psychological control on teenage anxiety are especially noticeable in the Chinese cultural milieu. Due to the emphasis on “filial piety” in traditional Chinese culture, which includes deference and obedience, certain parents are more likely to employ psychological control techniques, including creating guilt, to promote compliance [20]. Concurrently, Chinese adolescents facing significant academic competition may be more sensitive to parental control, which can exacerbate anxiety [21].

Based on the aforementioned theoretical and empirical support, this study proposes Hypothesis 1 (H1).

Hypothesis 1 (H1): *Anxiety among middle school adolescents is positively correlated with parental psychological control.*

1.2 The Mediating Role of Basic Psychological Needs

According to Self-Determination Theory (SDT), healthy growth depends on the satisfaction of three basic psychological needs: relatedness, competence, and autonomy [22]. By restricting individual choice, diminishing relational trust, and undermining self-efficacy, intrusive parenting techniques like psychological control directly obstruct the fulfillment of these demands [13]. Adolescents are more susceptible to emotional problems, such as anxiety, when these demands are not met [23]. For example, a study by Li et al. [23] discovered that parental psychological control strongly predicts that adolescents’ basic psychological requirements won’t be met, which makes it difficult for them to adjust emotionally. According to Soenens et al. [13], psychological control weakens teenagers’ sense of autonomy and belonging, which in turn causes anxiety and depressive symptoms.

The association between parental practices and the emotional outcomes of teenagers is mediated by the fulfilling of basic psychological needs, according to additional studies. A longitudinal study with Chinese teenagers found that parental psychological control has an indirect effect on anxiety levels six months later by reducing the satisfaction of adolescents’ basic psychological needs [23]. Additionally, the study [24] found that the satisfaction of basic psychological needs fully mediates the relationship between parental control behaviors and adolescent anxiety, suggesting that psychological control mainly impacts emotional health by impeding the satisfaction of basic psychological needs.

Based on the aforementioned theoretical and empirical foundations, this study proposes Hypothesis 2 (H2).

Hypothesis 2 (H2): *The association between parental psychological control and anxiety in middle school children is mediated by the fulfillment of teenagers’ basic psychological needs.*

1.3 The Mediating Role of Self-Compassion

The ability to treat oneself with kindness, understanding, and acceptance in the face of challenges or setbacks while acknowledging that suffering is a common human experience and keeping a mindful awareness of the present moment without excessive ruminating is known as self-compassion [25]. In fact, self-compassion theory suggests that people can effectively reduce emotional discomfort when they approach their own suffering with acceptance and kindness [25]. According to attachment theory [24], early encounters with parents help people create internal working models for both themselves and other people. Adolescents may internalize their parents’ controlling views as self-criticism as a result of parental psychological control, an invasive and manipulative parenting style that weakens their ability for self-compassion [26]. Parental psychological control strongly predicts anxiety, depressive symptoms, and suicidal tendencies in adolescents via lowering levels of self-compassion, with self-compassion acting as a complete mediator in this route,

according to a longitudinal study by Geng et al. [26]. Therefore, self-compassion plays an important mediating role in the relationship between parental psychological control and teenage anxiety. It serves as both an internal emotional regulation mechanism and a compensatory resource for basic psychological needs. In addition to the detrimental impacts mentioned above, parental psychological control erodes adolescents' sense of emotional safety and self-integrity, which lowers their levels of self-compassion.

Parental psychological control and self-compassion are significantly correlated negatively, according to empirical research [27]. People who have lower levels of self-compassion are more prone to develop self-critical thought patterns, which makes it harder for them to control their negative emotions and raises the risk of experiencing anxiety symptoms [28]. In this case, the association between stressors and emotional consequences can be mediated by self-compassion. For instance, research has demonstrated that self-compassion is a major mediator between family functioning and adolescent depression and anxiety [29] and partially mediates the association between childhood maltreatment and adult anxiety [26].

Based on the aforementioned theoretical and empirical evidence, we propose Hypothesis 3 (H3).

Hypothesis 3 (H3): *Middle school adolescents' anxiety and parental psychological control are mediated by self-compassion. In particular, psychological control by parents may make teenagers less self-compassionate, which would make them more anxious.*

1.4 The Chain-Mediating Role of Basic Psychological Needs and Self-Compassion

As was previously mentioned, self-compassion and basic psychological needs may act as mediators between teenage anxiety and parental psychological control. When taken as a whole, these variables may also operate as a chain mediator between teenage anxiety and parental psychological control [18]. In fact, Li et al. [30] discovered that a decrease in the fulfillment of teenagers' fundamental psychological needs, which is favorably connected with self-compassion, is strongly predicted by parental psychological control. Geng et al. [26] also noted that the association between familial stress and internalizing difficulties in teenagers is mediated by basic psychological needs and self-compassion.

This study suggests Hypothesis 4 (H4) in light of this.

Hypothesis 4 (H4): *The association between parental psychological control and anxiety in middle school kids is mediated by both self-compassion and the fulfillment of teenagers' basic psychological needs. In particular, it is anticipated that parental psychological control will first make it harder for teenagers to meet their basic psychological requirements, which will next make them less self-compassionate and ultimately raise their anxiety. The hypothesized model is presented in Fig. 1.*

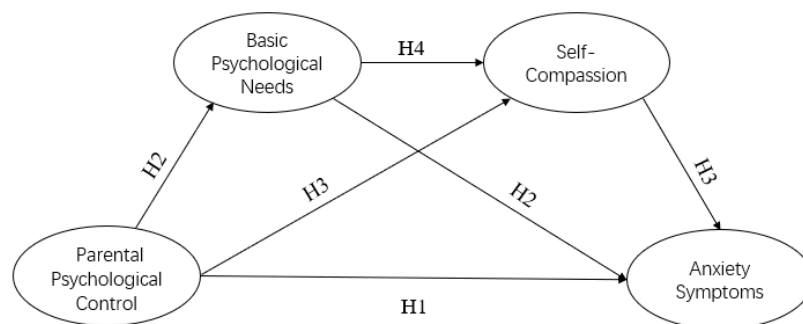


Figure 1: The hypothesized chain mediation model.

2 Methods

2.1 Participants

Data were collected from middle school students in Sichuan and Hebei provinces, China, using a convenience sampling approach at the classroom level. After obtaining informed assent/consent, 9823 questionnaires were administered. Following the exclusion of 1392 invalid responses (e.g., patterned or incomplete), the final sample comprised 8342 adolescents. While this dataset has been used to examine parental control in relation to suicidal ideation [30], the present study leverages it to investigate a distinct outcome—anxiety symptoms—and a different mediating mechanism involving self-compassion. The Research Project Ethical Review Application Form, Faculty of Psychology, Southwest University of China, approved this study in compliance with the Declaration of Helsinki (IRB protocol number: H23175; approval date: 15 September 2023). The participants' ages ranged from 10–20 years, with a mean age of 15.86 years ($SD = 1.79$). The sex distribution included 3951 male (47.40%) and 4391 female (52.60%). The grade distribution was as follows: 1142 first-year junior high students (13.70%), 1050 s-year junior high students (12.60%), 914 third-year junior high students (11.00%), 1334 first-year senior high students (16.00%), 1879 s-year senior high students (22.50%), and 2023 third-year senior high students (24.30%).

2.2 Measures

2.2.1 Parental Psychological Control

Parental psychological control was assessed using Barber's PCS-YSR [12], a 10-item test that measures emotional invalidation, love withdrawal, and personal criticism (e.g., "My parent tries to change my mind"), was used to measure parental psychological control. Higher scores indicated greater perceived control. Items were evaluated from 1 (not at all true) to 5 (extremely true). In our sample, the scale showed acceptable structural validity and strong internal consistency ($\alpha = 0.95$). The scale demonstrated a good structure ($\chi^2/df = 2.25$, CFI = 0.94, TLI = 0.92, RMSEA = 0.05, SRMR = 0.03).

2.2.2 Basic Psychological Needs Satisfaction

A questionnaire created by Sheldon et al. [31] was used to gauge the satisfaction of fundamental psychological needs. There are nine items on this survey, such as "I can act in my own way." On a 7-point Likert scale, with 1 representing "very much not true" and 7 representing "very much true," participants scored each item. Greater fulfillment with fundamental psychological demands is indicated by higher ratings. The scale's Cronbach's alpha coefficient in this investigation was 0.78. The scale demonstrated a good structure ($\chi^2/df = 2.24$, CFI = 0.93, TLI = 0.90, RMSEA = 0.05, SRMR = 0.06).

2.2.3 Self-Compassion

The Self-Compassion Scale, which was created by Neff et al. [25] and updated by Gong et al. [32], was used to gauge self-compassion. The twelve items on the scale cover three dimensions: awareness, shared humanity, and self-kindness (e.g., "When things go wrong, I can recognize that experiencing setbacks is a part of life"). Each item was graded in reverse on a 5-point Likert scale, with 1 denoting "not at all true" and 5 denoting "always true." A higher level of self-compassion is indicated by higher overall scores. The scale's Cronbach's alpha coefficient in this investigation was 0.78. The scale demonstrated a good structure ($\chi^2/df = 2.17$, CFI = 0.95, TLI = 0.92, RMSEA = 0.04, SRMR = 0.03).

2.2.4 Anxiety Symptoms

The seven-item Generalized Anxiety Disorder Scale [33], which was mainly created to screen for and aid in the diagnosis of anxiety disorders as well as assess the intensity of anxiety symptoms, was used to measure anxiety symptoms. The scale employs a 4-point Likert scale from 0 (not at all) to 4 (almost every day) and consists of seven items, such as “Feeling tense, anxious, or on edge.” Increased anxiety is indicated by higher overall scores. The scale’s Cronbach’s alpha coefficient in this investigation was 0.92. The scale demonstrated a good structure ($\chi^2/df = 2.25$, CFI = 0.94, TLI = 0.92, RMSEA = 0.05, SRMR = 0.05).

2.3 Demographic Information

A self-developed questionnaire was used to gather demographic data, with the main variables being sex, age, and subjective socioeconomic level. Age was considered a continuous variable (measured in years), whereas sex was considered a categorical variable. A single-item question, such as “How would you rate your family’s economic status compared to others in your area?” with response possibilities ranging from 1 (lower) to 5 (higher), was used to gauge subjective socioeconomic status. A higher perception of one’s family’s socioeconomic level is indicated with higher scores.

2.4 Data Analysis

Descriptive statistical analyses were carried out using SPSS Statistics software (version 27.0; IBM Corp., Armonk, NY, USA) to summarize the sample characteristics. These analyses included averages and standard deviations for quantitative variables (e.g., age, socioeconomic position, parental psychological control, fundamental psychological needs, self-compassion anxiety symptoms) and proportions for categorical variables (e.g., sex). Sex was categorized as a dichotomous variable (male = 1, female = 0) to facilitate correlation and mediation investigations. The correlations between the variables were examined using Pearson’s correlation analysis since all of the variables were regarded as continuous or dichotomous and met the criteria for such studies.

To test the proposed model, structural equation modeling (SEM) and mediation studies were performed using Mplus 8.3 (Muthén & Muthén, Los Angeles, CA, USA). The Maximum Likelihood Method was used to estimate the model’s parameters. Several indices were used to assess model fit, including χ^2 , CFI, TLI, RMSEA, and SRMR. The following criteria were applied in accordance with recognized norms [34–36]: TLI values between 0.80 and 0.90, CFI \geq 0.90, SRMR \leq 0.08, and RMSEA $<$ 0.10 were deemed satisfactory. Excellent fit is indicated by values that exceed these benchmarks, such as CFI $>$ 0.95, TLI $>$ 0.95, and RMSEA $<$ 0.06. The bootstrap approach (5000 resamples) with 95% confidence intervals (CIs) was used to examine the mediation effects. If the CI did not contain zero, mediation effects were deemed substantial. The threshold for statistical significance was chosen at $p < 0.05$ [37].

3 Results

3.1 Descriptive Statistics and Correlation Analysis

For each variable, descriptive statistics and correlation analysis were performed. Table 1 displays the results. Significant correlations were found between anxiety symptoms in middle school adolescents and parental psychological control, self-compassion, and the fulfilling of fundamental psychological needs.

Table 1: Descriptive statistics and correlation analysis (N = 8342).

Variables	Mean	SD	1	2	3	4	5	6	7
1. Age	15.78	1.83	1						
2. Sex	-	-	-0.035**	1					
3. SES	4.37	1.51	-0.093***	0.025*	1				
4. Parental psychological control	2.24	0.87	0.034***	0.075***	-0.027*	1			
5. Basic psychological needs	2.81	0.64	-0.110***	-0.018	0.105***	-0.386***	1		
6. Self-Compassion	3.34	0.58	-0.057***	0.048***	0.086***	-0.356***	0.643***	1	
7. Anxiety Symptoms	0.67	0.60	0.234***	-0.081***	-0.109***	0.341***	-0.451***	-0.454***	1

Note: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; Sex (female = 0, male = 1); SES = socioeconomic status; SD = standard deviation.

3.2 Hypothesis Testing

A chain mediation model was built with parental psychological control as the independent variable, fundamental psychological needs and self-compassion as the mediating factors, and anxiety symptoms as the dependent variable after adjusting for age, sex, and socioeconomic position. Excellent fit to the data was shown by the model

($\chi^2 = 5050.756$, $df = 65$, CFI = 0.910, TLI = 0.878, RMSEA = 0.096, SRMR = 0.078).

As Fig. 2 shows, parental psychological control significantly and negatively predicted basic psychological needs satisfaction ($\beta = -0.444$, $p < 0.001$) and significantly and positively predicted anxiety symptoms ($\beta = 0.192$, $p < 0.001$), but it did not significantly predict self-compassion ($\beta = 0.000$, $p = 0.988$). Basic psychological needs were a significant and positive predictor of self-compassion ($\beta = 0.717$, $p < 0.001$) and a significant and negative predictor of anxiety symptoms ($\beta = -0.307$, $p < 0.001$).

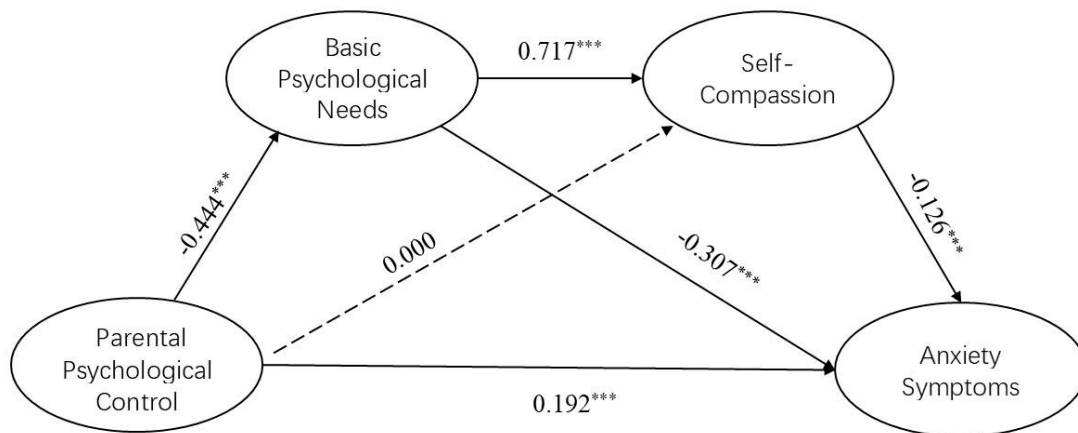


Figure 2: The mediating effects of basic psychological needs and self-compassion on the relationship between parental psychological control and anxiety symptoms. Note: *** $p < 0.001$. All paths are standardized, dashed lines represent non-significance, and the indicators for each latent variable are shown.

Furthermore, self-compassion was a substantial and negative predictor of anxiety symptoms ($\beta = -0.126$, $p < 0.001$). The individual mediating effect of basic psychological requirements was significant ($\beta = 0.136$, $SE = 0.010$, 95% CI [0.116, 0.156]), accounting for 36.86% of the total effect, according to Table 2’s bootstrap mediation analysis. Self-compassion did not have a significant individual mediating impact ($\beta = 0.000$, $SE = 0.002$, 95% CI [-0.004, 0.004]). The sequential pathway in which parental control predicted lower basic needs satisfaction, which was linked to decreased self-compassion and eventually increased anxiety, was supported by a significant chain indirect effect ($\beta = 0.040$, 95% CI [0.025, 0.055]). This pathway

demonstrated the cascading role of self-compassion after need frustration, accounting for about 11% of the overall effect. These findings provide credence to the mediating function of basic psychological needs as well as the chain-mediating relationship between self-compassion and basic psychological needs. Self-compassion did not, however, have a statistically significant mediating impact.

Table 2: Mediating effect analysis of basic psychological needs and self-compassion.

Pathway	β	Boot SE	Bootstrap 95%CI		Percentage
			Lower Limit	Upper Limit	
Parental Psychological Control → Anxiety Symptoms	0.192		0.163	0.220	52.03%
Parental psychological control → Basic psychological needs → Anxiety Symptoms	0.136	0.010	0.116	0.156	36.86%
Parental Psychological Control → Self-Compassion → Anxiety Symptoms	0.000	0.002	-0.004	0.004	0%
Parental psychological control → Basic psychological needs → Self-Compassion → Anxiety Symptoms	0.040	0.008	0.025	0.055	10.84%
Total indirect effect	0.177	0.007	0.162	0.191	47.97%

4 Discussion

This study outlines a particular psychological pathway that connects intrusive parenting to teenage anxiety by fusing self-determination theory with studies on self-compassion. The results show that parental psychological control exacerbates anxious symptoms both directly and through a mediated sequence: it first inhibits the fulfillment of fundamental psychological needs, which then impedes the growth of self-compassion. H1, H2, and H3 are supported by these results, while H4 is not. This implies that self-compassion does not independently moderate the association between parental psychological control and anxiety, even while the satisfaction of fundamental psychological needs plays a significant role in this relationship.

4.1 The Relationship between Parental Psychological Control and Anxiety Symptoms in Middle School Students

Parental psychological control was found to be a significant positive predictor of teenage anxiety, which is in line with our initial prediction. This is consistent with a large body of evidence that links this parenting approach to an increased risk of anxiety in young people [38]. Our results support the idea that psychologically controlling behaviors, which limit autonomy and cause guilt, are a prominent environmental stressor that contributes to anxious symptomatology in adolescence. From a molecular standpoint, there are multiple mechanisms that connect teenage anxiety and parental psychological control. First, it restricts the teenagers' ability to develop autonomous decision-making and problem-solving abilities by directly undermining their feeling of autonomy. Second, it makes it challenging for teenagers to develop a steady sense of self-worth by upsetting the emotional safety that is the cornerstone of positive parent-child relationships. Adolescents who experience psychological control are also more likely to develop negative cognitive biases and perceive everyday stressful events as threats, which intensifies anxiety reactions.

The results of this study further support the detrimental impact of parental psychological control in the development of anxiety in teenagers by closely aligning with the body of literature that discusses the mechanisms between internalizing difficulties and parental psychological control [39]. This emphasizes how crucial it is to take into account the family parenting environment in adolescent mental health interventions,

with a focus on the necessity of lowering parental psychological control practices in order to lessen the start and advancement of anxiety symptoms.

4.2 The Mediating Role of Basic Psychological Needs

With an emphasis on the mediating function of fundamental psychological needs, this study investigated the mechanisms via which parental psychological control influences anxiety in teenagers. According to our mediation study, anxiety was significantly predicted negatively by the satisfaction of basic psychological requirements. This emphasizes how crucial it is to satisfy needs in order to shield them from anxiety. Significant anxiety symptoms are less likely to occur when these needs are met to a greater extent. Children are less likely to experience anxiety when their basic psychological needs are satisfied because they are more likely to acquire a good self-identity and worldview [25]. Furthermore, the results show that parental psychological control influences adolescents' basic psychological needs, which indirectly influences anxiety symptoms in addition to directly and favorably predicting them. This is consistent with the self-determination theory [16], which holds that fundamental psychological requirements are psychological necessities for personal development and mental health. In particular, as a detrimental parenting approach that fails to meet children's relational needs, parental psychological control directly contributes to the breakdown of parent-child connections [38]. Children may experience feelings of loneliness and misunderstanding as a result of this lack of connection, which raises their risk of anxiety [40]. Additionally, children's autonomy and independent expression are suppressed and interfered with by parental psychological control, which hinders the development of a healthy sense of self-awareness and perspective and prevents children from having their autonomy needs met [38]. Children's sense of control and self-identity are further undermined by this lack of autonomy, which exacerbates their anxiety. More significantly, children's competence demands are adversely affected by this regulated approach. Children may feel helpless and deprived of a sense of accomplishment if they are unable to explore and fulfill their potential due to excessive control and limits. Their sense of self-worth and self-efficacy may be further undermined by this frustration with competence needs, which can exacerbate feelings of hopelessness and powerlessness and increase their vulnerability to anxiety symptoms [41].

Parental psychological control is therefore linked in a number of ways to the (lack of) fulfillment of children's fundamental psychological needs, which is eventually connected to an increased risk of anxiety. Basic psychological requirements are important mediating factors between anxiety symptoms and parental psychological control, according to both theoretical and empirical viewpoints. Enhancing the fulfillment of fundamental psychological needs and improving parenting practices may be crucial intervention techniques for reducing teenage anxiety.

4.3 The Role of Self-Compassion in the Mediation Chain

The findings of this study show that there is no substantial individual mediating impact of self-compassion between anxiety symptoms in teenagers and parental psychological control. This result is at odds with other research that sees self-compassion as a mediator factor between psychological control and problems with psychological adjustment [18]. In contrast to findings about other outcomes, such as suicidal ideation, where meaning in life demonstrated a direct mediating role, it is interesting to note that self-compassion did not emerge as a direct mediator in this model [31]. When it comes to anxiety, self-compassion seems to serve mostly as a secondary emotion-regulating resource that is only disrupted when fundamental psychological requirements are not met. This emphasizes how self-compassion's ability to prevent anxiety may depend on the satisfaction of earlier, more basic psychological needs. This

discrepancy can result from these research' inadequate consideration of a more fundamental pathway for fundamental psychological requirements. In their investigation of the connection between childhood trauma and problematic smartphone use, Geng et al. [26] found that while self-compassion's individual mediating effect was not significant, meeting fundamental psychological needs was found to be a crucial requirement for its operation.

In a similar vein, this study discovered that parental psychological control had an indirect effect on adolescents' levels of self-compassion by influencing how well their fundamental psychological needs were met. This finding suggests that parental psychological control may impair an individual's capacity to develop adaptive coping strategies (like self-compassion) by affecting the fundamental "nutrient" of individual development—basic psychological needs [41]. This finding further supports and expands upon the perspectives of Self-Determination Theory [16] and Self-Compassion Theory [25]. In line with earlier studies on the connection between self-compassion and different emotional adjustment issues, the individual mediating impact of self-compassion was not significant, but it did exhibit a substantial negative link with anxiety symptoms [41]. Higher levels of self-compassion in adolescents typically result in improved emotional regulation [42], the development of constructive coping mechanisms [41], and the possession of positive psychological resources like optimism and resilience [43], all of which lower the likelihood of anxiety. In the particular framework of Chinese culture, this insignificant direct way can also be comprehended. Instead of being a direct cause of self-criticism, the emphasis on interdependence and "filial piety" may cause teenagers to view parental supervision as a normal, albeit stressful, part of family life [20]. The fulfillment of fundamental psychological needs, which are essentially relational, may work as a more immediate and crucial mediator in such a collectivist context, influencing self-compassion later. In contrast to certain studies carried out in more individualistic environments, this possible cultural characteristic provides one explanation for the observed pattern [44].

It might be advantageous to include self-compassion training in mental health education. Students' emotional regulation skills can be improved, thereby reducing anxiety, by helping them to embrace their flaws.

4.4 The Chain Mediating Role of Basic Psychological Needs and Self-Compassion

Interestingly, the sequential path from basic psychological needs to self-compassion was significant, whereas the independent path through self-compassion was not significant. This suggests that self-compassion largely serves as a secondary mediator rather than a direct one. The findings show that a significant chain mediation route between parental psychological control and anxiety symptoms in adolescents is formed by basic psychological needs and self-compassion. This result is consistent with the theoretical predictions of Self-Determination Theory [16], which postulates that parental psychological control weakens adolescents' capacity for self-compassion and raises their risk of anxiety by both directly aggravating anxiety symptoms and impeding the satisfaction of fundamental psychological needs. In particular, by restricting adolescents' autonomy, lowering their sense of competence, and harming their sense of belonging in interpersonal relationships, parental psychological control seriously impedes the fulfillment of fundamental psychological needs [23]. The development of self-compassion is hampered by insufficient satisfying of basic psychological needs, which are fundamental resources for individual psychological growth. The Self-Determination Theory states that an individual's intrinsic motivation and emotional regulation skills are inhibited when their basic psychological needs are not met, which makes it challenging to develop self-acceptance and caring [16]. Adolescents are therefore more prone to self-criticism than self-understanding when they encounter failure or hardship, which lowers their degree of self-compassion [25]. They are more likely to

internalize problems like anxiety because they lack self-compassion, which makes it harder for them to deal with emotional suffering [45,46].

This pathway is consistent with the findings of Gerber and Anaki [47], who found a strong positive correlation between self-compassion and the satisfaction of basic psychological needs, both of which act as joint mediators in the relationship between different stressors and psychological adjustment problems. Self-compassion's function in the chain pathway should not be disregarded, even though its mediating effect was not statistically significant. Similarly, rather than serving as a direct front-end coping mechanism for environmental stresses, self-compassion was found to function as a downstream mediating variable between basic psychological needs and internalizing symptoms in a study by Li et al. [23] involving Chinese adolescents.

The establishment of the chain mediation pathway “parental psychological control → basic psychological needs → self-compassion → anxiety symptoms,” which offers a more thorough explanation for comprehending the internal mechanisms by which parenting behaviors influence adolescents' emotional health, is thus theoretically and empirically confirmed by this study. In order to attain more effective anxiety prevention and alleviation, future intervention techniques could concurrently focus on fostering the fulfillment of fundamental psychological needs and developing self-compassion abilities.

4.5 Strengths and Limitations

From a theoretical perspective, this study demonstrated the internal process by which basic psychological needs are undermined by parental psychological control, which in turn weakens the capacity for self-compassion and eventually causes anxiety symptoms. This enhances our comprehension of the psychological mechanisms by which the family environment affects teenage emotional problems. The findings provide empirical support for related theoretical constructs by highlighting the role of self-compassion as a positive emotional regulation resource within the chain mechanism and supporting and extending the explanatory power of self-determination theory in the context of parenting and emotional health.

This study provides valuable information for preventing and treating teenage anxiety from a practical and mental health promotion standpoint. According to our findings, interventions ought to use a two-pronged approach. Programs (such as autonomy-supportive parenting courses) should be implemented at the family level with the goal of lowering psychological control and creating a setting that meets the fundamental needs of teenagers. Concurrently, focused self-compassion training (such as mindfulness and cognitive restructuring exercises) should be included in school-based mental health curriculum at the individual level. This combination tackles the downstream cognitive-affective vulnerability (poor self-compassion) unique to anxiety as well, the upstream contextual trigger (parental control undermining basic needs). A more need-sensitive environment for teenage development can be created at the community level by promoting easily accessible support resources and increasing public understanding of the effects of parenting methods. When combined, these multi-level approaches can successfully convert research findings into practice that promotes long-term psychological well-being.

There were a number of restrictions on this study. First, strict causal conclusions between variables are limited by the use of cross-sectional data. To further confirm the temporal and causal components of the chain mediation pathway, future studies may employ experimental or longitudinal approaches. Second, even though the final sample size was big, a formal a priori power analysis to determine the minimum required sample size was not carried out prior to data collection. Third, there may be a shared method bias because all of the data came from teenagers' self-reports. Parent reports, instructor evaluations, and multisource data for cross-validation could all be used in future research. Furthermore, the results of this

study are limited to a particular group of middle school pupils in a particular area, and additional validation is needed to ensure that they are consistent across cultures and age groups. Additionally, although this study concentrated on the mediating processes of self-compassion and basic psychological needs, it excluded other possible influencing factors including peer interactions and school climate. To improve the explanatory power, future study could create a more thorough theoretical model. Notwithstanding these drawbacks, this study offers insightful empirical information about the mechanisms by which parental psychological control influences teenage anxiety. Convenience sampling and a wide age range (10–20 years) that includes junior and senior middle school grades may also restrict the findings' generalizability and add sample variability. When interpreting the results, these sampling factors should be taken into account. Additionally, additional potential confounding factors including academic pressure, parental warmth, peer support, and school climate were not included, even though age, sex, and socioeconomic status were controlled. These elements could be included in future research to create a more complete model.

5 Conclusions

This study reveals a sequential psychological mechanism via which parental psychological control exacerbates anxiety in Chinese teenagers, guided by an integration of self-determination and self-compassion theories. According to the chain mediation model, intrusive parenting causes harm by first undermining fundamental psychological needs, which in turn prevents the development of self-compassion, a crucial emotional defense against anxiety. The results showed that self-compassion and basic psychological needs act as chain mediators in this relationship; adolescents' basic psychological needs are undermined by parental psychological control, which also lowers their levels of self-compassion and raises the likelihood of anxiety symptoms.

This finding provides empirical evidence for the application of self-determination and self-compassion theories in the context of parent-child relationships by highlighting the internal mechanisms via which family environment elements impact teenagers' emotional wellbeing. Practically speaking, the research indicates that intervention efforts should take a two-pronged approach: on the one hand, parents should be guided to lessen psychological control and support adolescents' autonomy, competence, and sense of belonging; on the other hand, self-compassion training should be used to improve adolescents' emotional regulation skills. This two-pronged approach can successfully prevent and reduce anxiety while fostering teenagers' healthy psychological development.

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