



Parental conflict and adolescent academic engagement: a longitudinal chain mediation model of basic psychological needs satisfaction and psychological reactance

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Abstract

This study, based on the integrative model of engagement, explores the impact of adolescents' perceived parental conflict on academic engagement and the chain mediation mechanism of basic psychological needs satisfaction and psychological reactance. Through a questionnaire-based method, this longitudinal research monitored 1050 adolescents over a period of six months. The results revealed that: (1) Parental conflict at Time 1 (T1) significantly negatively predicts academic engagement at Time 2 (T2); (2) Basic psychological needs satisfaction at T1 significantly mediates the relationship between T1 parental conflict and T2 academic engagement independently; (3) Psychological reactance at T1 significantly mediates the relationship between T1 parental conflict and T2 academic engagement independently; (4) T1 basic psychological needs satisfaction and T1 psychological reactance function together in a chain mediation model, mediating the relationship between T1 parental conflict and T2 academic engagement. These findings shed light on the mechanisms through which parental conflict influences adolescent academic engagement and highlight the importance of individual psychological factors, offering insights into mitigating the negative impacts of family discord on adolescent academic performance.

Keywords Parental conflict · Academic engagement · Basic psychological needs satisfaction · Psychological reactance · Longitudinal study

Introduction

Adolescents' academic achievement predicts their achievement and wellbeing later in life (Duncan et al., 2007). In recent years, psychologists and educators have shifted from focusing primarily on academic achievement to emphasizing the learning process (Barger et al., 2019; Ning & Yang, 2022; Zhen et al., 2017). One aspect of the learning process

is academic engagement, which refers to sustained learning motivation characterized by vigor, dedication, and deep concentration. It encompasses the positive emotions students experience while participating in study-related activities (Schaufeli et al., 2002). Research has shown that positive academic engagement not only stimulates students' learning potential and enhances their academic capabilities but also profoundly influences their future development (Anderman & Patrick, 2012; Symonds et al., 2023).

The Integrative Model of Engagement posits that students' academic engagement is the outcome of the interplay between individual and environmental factors, both of which are in constant flux (Wang et al., 2019). One of the most crucial micro-environments for adolescents' development is the family (Bronfenbrenner & Morris, 1998). Within the family, perceived parental conflict – i.e., the verbal or physical aggressive behaviors between parents arising from disagreements or other reasons as perceived by children (Grych & Fincham, 1990) – is widely found as a significant risk factor for adolescents' internalizing symptoms (e.g.,

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anxiety), externalizing problems (e.g., delinquency), social interpersonal relationships and academic performance (Davies & Martin, 2013; Harold & Sellers, 2018; Van Eldik et al., 2020; Li et al., 2024).

The present study examines the relationship between adolescents' immediate environment – particularly perceived parental conflict – and their academic engagement. In addition, the study also examines the potential mediation effects of adolescents' psychological factors, including basic psychological need satisfaction and psychological reactance. By examining both environmental and individual factors, this study is expected to provide a comprehensive perspective for understanding the factors influencing adolescent academic engagement, providing insights for parenting practices.

Parental conflict and academic engagement

According to the resource allocation model, an individual's cognitive resources are limited (Zemp et al., 2014). When adolescents face multiple challenges, they need to allocate these limited resources, which may interfere with their completion of the primary task (Zemp et al., 2014). For example, coping with parental conflict may interfere with adolescents' academic tasks. When encountering parental conflict, adolescents are likely to experience negative emotions such as fear and anxiety (Davies et al., 2002), and even emotional problems (Yang et al., 2022), perceive these conflicts as threats, or engage in self-blame (Grych et al., 2000). These emotions and perceptions may lead adolescents to persistently and repeatedly ruminate on the pain brought about by parental conflict (Johnson et al., 2015; Nolen-Hoeksema et al., 2008). These emotional and cognitive responses may deplete adolescents' cognitive resources, thereby hindering their engagement in academic activities. (Buehler et al., 2007; Wang et al., 2014). Indeed, a study with 1989 families in China found a negative correlation between parental conflict on child-rearing issues and children's academic engagement (Yang et al., 2022). Foreign studies have also found that parental conflict is negatively correlated with children's academic performance. The more conflict teenagers perceive between their parents, the worse their academic performance will be (Harold et al., 2007; Ghazarian & Buehler, 2010; King & Mrug, 2018). In summary, both the resource allocation theory and the above studies suggest that parental conflict may negatively impact adolescent academic engagement.

Potential mediating effect of basic psychological need satisfaction

Following the discussion on parental conflict and academic engagement, we turn to the pivotal role of basic

psychological needs within the framework of Self-Determination Theory (SDT). According to Ryan and Deci (2000), SDT articulates that these needs serve as mediating variables, bridging the social environment and individual behaviors. When these basic psychological needs—competence, autonomy, and relatedness—are satisfied, adolescents are more likely to follow developmental pathways that promote self-enhancement (WU et al., 2018). This underlines the importance of satisfying these needs as they critically shape students' academic engagement, positioning basic psychological need satisfaction as a central mediator in educational contexts (Yu et al., 2015). In this study, our exploration is specifically centered on family contexts.

Family systems theory suggests that the family is a microsystem in which adolescents grow and develop (Bronfenbrenner & Morris, 1998), consisting of interdependent subsystems (Minuchin, 1974). The spillover hypothesis posits that emotions and activities in one subsystem of the family can overflow and affect another subsystem (Erel & Burman, 1995). When the spousal subsystem is dysfunctional and fails to fulfill its respective roles, the parent-child subsystem is affected. Parents in a positive spousal relationship tend to view their children with a positive mindset and behavior, fostering a secure and warm parent-child relationship. Conversely, conflict-ridden parental relationships may lead to negative parental attitudes towards children, ultimately resulting in unhealthy parent-child relationships (Nelson et al., 2009). Research by Costa et al. (2019a, b) indicates that supportive parenting practices from both parents, such as autonomy support, structure, and warmth, contribute to adolescents' basic psychological needs satisfaction. Conversely, frustrating parenting practices, including psychological control, chaos, and rejection, negatively impact the satisfaction of these needs.

In schools, the primary function of psychological needs is to stimulate students' intrinsic motivation, thereby promoting their participation in classroom activities and tasks (Reeve, 2013). Students who feel satisfied with their basic psychological needs tend to experience greater academic well-being and are more engaged in school activities (Niemiec & Ryan, 2009). Existing studies have demonstrated that, for adolescents, the basic psychological needs satisfaction can positively predict academic engagement (Maralani et al., 2016; Chen & Zhang, 2022).

Therefore, we hypothesize that parental conflict may impair adolescents' basic psychological needs satisfaction, damages their intrinsic motivation and consequently affects their academic engagement. In other words, the basic psychological needs satisfaction may mediate the impact of parental conflict on academic engagement.

Potential mediating effect of psychological reactance

Psychological reactance is an innate psychological tendency or motivational state of noncompliance that arises when individuals perceive a threat or deprivation of their freedoms or autonomy, manifesting as oppositional emotional experiences and behavioral tendencies (Brehm & Cole, 1966; Brehm, 1981). Psychological Reactance Theory (PRT) posits that individuals cherish their capacity to make and execute free behaviors; when this capacity is constrained, it generates aversion, thereby motivating individuals to attempt to restore their lost freedoms (Brehm, 1966; Brehm & Brehm, 2013; Rosenberg & Siegel, 2018). This motivational state often coexists with negative emotions and thoughts (Quick & Stephenson, 2007; Rains & Turner, 2007). Psychological reactance is particularly pronounced among adolescents, as this developmental period is marked by transitions in thought, personality, and self-concept, with a strong emphasis on individual freedom and autonomy. When these desires are blocked or unmet, psychological reactance is easily triggered (Han et al., 2016).

According to the spillover hypothesis of Family Systems Theory, parental conflict in a family “spills over” into parent-child interactions, disrupting the established patterns of interaction (Hetherington et al., 1992; Erel & Burman, 1995), undermining adolescents’ secure exploration behaviors, leading to insecure parent-child attachments (Martin et al., 2017; Yang et al., 2022a), and negatively impacting the parent-child relationship. Studies have found that in families with high levels of parental conflict, parent-child relationships tend to be worse, parenting styles more negative, and harsh, negative controlling, and neglectful parenting methods more likely (Li et al., 2011; Gong et al., 2016). Barber and Harmon (2002) noted that parenting styles characterized by low warmth inherently convey power differentials, leading to psychological reactance and subsequent detrimental developmental outcomes.

Regarding the subsequent impacts of psychological reactance, the majority of studies have examined how adolescents’ psychological reactance is linked to substance dependencies, including tobacco and alcohol (Donaldson et al., 2023; Wium et al., 2009; Miller et al., 2006), with fewer studies investigating its impact on adolescents’ academic performance. A sub-study by Van Petegem et al. (2015) found that adolescents’ state reactance significantly negatively predicted their willingness for academic engagement next time, i.e., whether they were inclined to study more, study in different ways, and study more thoroughly, providing some support for the relationship between the two.

Therefore, we speculate that parental conflict, accompanied by poor parent-child relationships, may foster adolescents’ psychological reactance, thereby affecting learning

engagement. That is, psychological reactance may mediate the impact of parental conflict on learning engagement.

Potential chain mediating effect of basic psychological need satisfaction and psychological reactance

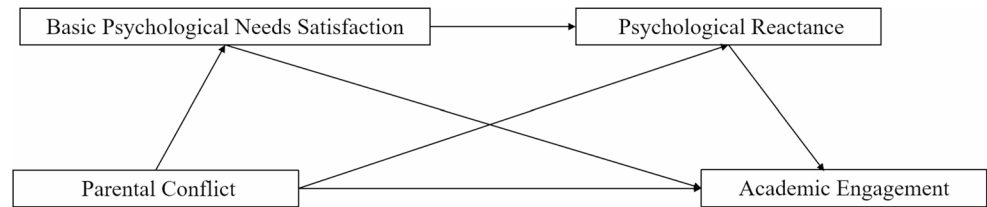
SDT posits that when psychological needs are actively obstructed, it triggers defensive behaviors as a response to the frustration of those needs (Deci & Ryan, 2000). One such defensive behavior is oppositional defiance, characterized by a stark refusal to accept authority and a propensity to act contrary to what is demanded (Deci & Ryan, 1985; Skinner & Edge, 2002). This concept closely aligns with psychological reactance.

Erikson (1994) notes that the task of identity formation during these years often leads teenagers to seek independence and individuality, pushing against societal and parental expectations. This drive for autonomy makes adolescents especially sensitive to imposed rules, regulations, and life transitions, which they may perceive as direct threats to their self-determination. Such perceived threats hinder the basic psychological needs satisfaction of adolescents for adaptive social development (Deci & Ryan, 2008), especially for autonomy and competence (Grolnick et al., 1997), and lead to defensive behaviors against these perceived constraints (Han et al., 2016). Empirical studies further demonstrate that the lower the autonomy adolescents experience at home, the stronger their psychological reactance, especially when they lack the ability to make decisions independently and are under strict parental control (Johnson & Buboltz, 2000; Van Petegem et al., 2015).

Therefore, psychological reactance not only manifests as a response to immediate restrictions but also as an ongoing resistance against the disruption of basic psychological needs satisfaction, especially during adolescence. We propose that unmet basic psychological needs could provoke psychological reactance in adolescents. That is, the basic psychological needs satisfaction and psychological reactance might sequentially mediate the effect of parental conflict on learning engagement.

The current study

Building upon the theoretical and empirical rationales outlined above, we hypothesize a negative correlation between parental conflict and adolescents’ academic engagement (H1). Furthermore, we posit that the basic psychological needs satisfaction (H2) and psychological reactance (H3) will act as mediating variables in this relationship, functioning either as individual mediators or in a chain mediation model (H4) (see Fig. 1). Our hypothesis for the chain

Fig. 1 The hypothesized chain mediation model

mediation model is that parental conflict impairs the basic psychological needs satisfaction, which then triggers psychological reactance in adolescents, ultimately leading to reduced academic engagement.

Methods

Participants

Participants were adolescents in grades 4 through 9 in Chengdu, Sichuan Province, China. Participants completed 2 rounds of surveys, separated by an interval of 6 months. A total of 1,433 participants completed the initial survey (Time 1, T1). We excluded participants from our study for several reasons to ensure the reliability and validity of our data. Those who failed one or more attention checks, such as not correctly responding to items like “This is an attention check item; please select ‘somewhat disagree,’” (adapted from Ren et al., 2022), were removed. This step helps confirm that participants were attentive and engaged while completing the survey. Participants from non-nuclear families were also omitted to maintain a consistent family structure across the sample. These criteria led to a final count of 1,146 valid participants. Due to student graduating or being absent, some participants did not participate in the second survey 6 months later (Time 2, T2). After excluding participants who did not complete both surveys, there were a total of 1,050 participants, resulting in a participant attrition rate of 9.14%. Prior research suggests that a 5% to 10% loss rate is acceptable and has minimal impact on the analytical outcomes (Barzi & Woodward, 2004; Tang et al., 2014). Additionally, independent samples *t*-tests on the T1 data of dropout participants ($n=96$) and valid participants ($n=1050$) showed no significant difference between the two groups in parental conflict, $t(1144)=1.70$, $p=0.092>0.05$. Although significant differences were found in basic psychological needs satisfaction [$t(1144)=-2.50$, $p<0.05$, $d=-0.25$] and psychological reactance [$t(1144)=3.58$, $p<0.001$, $d=0.36$], their effect sizes were both below 0.41, which is lower than the recommended minimum effect size for a “practically” significant effect in social science research (Ferguson, 2009), and therefore can be considered negligible. Overall, the findings suggest that there was no systematic loss of participants.

Among the final sample of 1,050 participants, 508 were boys (48.40%) and 542 were girls (51.60%), with an average age of 11.36 years ($SD=1.20$). Participants’ parents consented to their children’s involvement in this study. All participants signed an informed consent form before completing the surveys. All students participating receive gifts as compensation. All the contents of this study have been approved by the Ethics Committee of the author’s institution.

Materials

Parental conflict

Parental conflict was measured using the Children’s Perception of Interparental Conflict Scale (CPIC, Grych et al., 1992) in the Chinese adaptation by Chi and Xin (2002). This scale includes a subscale known as the Conflict Properties Scale, which breaks down conflict characteristics into three dimensions: conflict frequency, conflict intensity, and conflict resolution (Grych et al., 2000). Specifically, the conflict frequency dimension comprises six items, such as “Mom and Dad often argue or disagree.” The intensity dimension includes seven items, for example, “When my parents argue, they physically fight each other.” Lastly, the conflict resolution dimension is assessed through six items, including “After an argument, my parents usually make up quickly.” Seven grades from 1 (“completely inconsistent”) to 7 (“completely consistent”) were presented. In this study, the Cronbach’s alpha coefficient of the scale at T1 was 0.92.

Basic psychological needs satisfaction

The Chinese version of the Basic Psychological Needs Scale (C-BPNS, Liu et al., 2013) was used to measure basic psychological needs satisfaction, which has previously demonstrated good reliability and validity within the adolescent student population (Liu et al., 2013). The scale contains 19 items. All items are scored from 1 to 7 points, 1 indicating “completely inconsistent” and 7 indicating “completely consistent”. Higher scores indicate a higher degree of basic psychological needs satisfaction. In this study, the scale’s Cronbach’s alpha coefficient at Time 1 (T1) was 0.92.

Psychological reactance

The study employed the revised Hong Psychological Reactance Scale (HPRS, Hong & Page, 1989) by Cao (2008) as a tool to measure psychological reactance. The revised scale includes 11 items and employs a 7-point Likert scale where 1 indicates “completely disagree” and 7 indicates “completely agree.” The sum of the scores of the items yields a total score for psychological reactance; higher scores indicate stronger reactance. This scale has demonstrated good reliability and validity among Chinese adolescents (Han et al., 2016; Cai et al., 2022). In this study, the scale’s Cronbach’s alpha coefficient at T1 was 0.87.

Academic engagement

The study used the Chinese version of the Utrecht Work Engagement Scale–Student (UWES-S) to measure adolescents’ academic engagement, originally developed by Schaufeli et al. (2002) and revised by Fang et al. (2008). It includes 17 items across three dimensions: vigor, dedication, and absorption, scored using a 7-point Likert scale where 1 indicates “never” and 7 indicates “every day”. Higher scores indicate a greater level of individual academic engagement. In this study, the scale’s Cronbach’s alpha at Time 2 (T2) was 0.96.

Adolescent subjective socioeconomic status

The Chinese version of the Adolescent Subjective Socioeconomic Status Scale, developed by Hu et al. (2012), consists of two items: one item measuring the perceived socioeconomic status of the family compared to other people in the province within a wider societal context, and the other item measuring the socio-economic status of the family in relation to other students within the same school. A 10-point scoring system is used, with higher scores indicating a higher perceived subjective socioeconomic status. Similar to previous research (Zou & WU, 2023), this study controlled for adolescent subjective socioeconomic status.

Results

Common method bias

Harman’s single-factor test was used to assess common method bias through an exploratory factor analysis of all the items related to the variables in the study (Zhou & Long, 2004). The results identified seven factors with eigenvalues greater than 1, explaining 57.4% of the variance. The first factor explained 31.0% of the variance (<40% threshold), indicating that there is no severe common method bias in this study.

Descriptive statistics and correlation analysis

Table 1 displays the descriptive statistics for the variables. As shown in Table 1, correlational analysis reveals that T2 academic engagement is significantly negatively correlated with T1 parental conflict and T1 psychological reactance, while it is significantly positively correlated with T1 basic psychological needs satisfaction. T1 parental conflict is significantly negatively correlated with T1 basic psychological needs satisfaction and significantly positively correlated with T1 psychological reactance. Additionally, T1 basic psychological needs satisfaction shows a significant negative correlation with T1 psychological reactance, as detailed in Table 1.

Chain mediation analysis

First, all variables were standardized, and gender was dummy coded (boys=1, girls=0). Controlling for gender, age, and subjective socioeconomic status, the effect of T1 parental conflict on T2 academic engagement was examined. The results showed that before including the mediator variables, T1 parental conflict significantly and negatively predicted T2 academic engagement, $\beta = -0.24, t = -7.94, p < .001$.

Using the PROCESS Model 6 in SPSS (Hayes, 2013) and controlling for gender, age, and subjective socioeconomic

Table 1 Descriptive statistics and correlation analysis for variables

Variables	M±SD	1	2	3	4	5	6	7	8
1.T1Parental Conflict	2.01±1.11	—							
2.T1Basic Psychological Needs Satisfaction	5.89±0.99	-0.51**	—						
3.T1Psychological Reactance	2.74±1.24	0.40**	-0.54**	—					
4.T2 Academic Engagement	5.72±1.23	-0.29**	0.58**	-0.42**	—				
5.Gender	—	-0.05	0.03	0.01	0.07*	—			
6.Age	11.36±1.20	0.17**	-0.18**	0.17**	-0.16**	-0.02	—		
7.SSS-society	6.47±1.46	-0.16**	0.27**	-0.16**	0.22**	0.01	-0.06	—	
8.SSS-school	6.45±1.63	-0.20**	0.28**	-0.15**	0.23**	-0.01	-0.06*	0.71**	—

* $p < .05$, ** $p < .01$, *** $p < .001$, *M*, mean, *SD*, standard deviation

Table 2 Regression analysis of variable relationships in chain mediation model

Outcome	Predictor	β	t	95%CI
T1Basic Psychological Needs Satisfaction	T1Parental Conflict	-0.46	-17.10***	[-0.51, -0.40]
T1Psychological Reactance	T1Parental Conflict	0.16	5.50***	[0.11, 0.22]
	T1Basic Psychological Needs Satisfaction	-0.45	-14.56***	[-0.51, -0.39]
T2 Academic Engagement	T1Parental Conflict	0.04	1.25	[-0.02, 0.09]
	T1Basic Psychological Needs Satisfaction	0.48	14.64***	[0.42, 0.54]
	T1Psychological Reactance	-0.15	-4.94***	[-0.21, -0.09]

* $p < .05$, ** $p < .01$, *** $p < .001$. All estimations were standardized

Table 3 Bootstrap analysis results of mediating effect test

Pathways	Estimation	BootSE	95%CI	
			LLCI	ULCI
T1 PC \rightarrow T1 BPNS \rightarrow T2 AE	-0.22	0.02	-0.27	-0.17
T1 PC \rightarrow T1 PR \rightarrow T2 AE	-0.02	0.01	-0.04	-0.01
T1 PC \rightarrow T1 BPNS \rightarrow T1 PR \rightarrow T2 AE	-0.03	0.01	-0.05	-0.02
Total mediating effect	-0.27	0.02	-0.32	-0.23

PC Parental Conflict, BPNS Basic Psychological Needs Satisfaction, PR Psychological

Reactance, AE Academic Engagement. All estimations were standardized

status as well, the mediating roles of T1 basic psychological needs satisfaction and T1 psychological reactance between T1 parental conflict and T2 academic engagement were examined. The regression analysis (see Table 2) revealed: T1 parental conflict significantly negatively predicts T1 basic psychological needs satisfaction and significantly positively predicts T1 psychological reactance, but its predictive effect on academic engagement is not significant. Basic psychological needs satisfaction at T1 significantly negatively predicts T1 psychological reactance and significantly positively predicts T2 academic engagement. Psychological

reactance at T1 significantly negatively predicts T2 academic engagement.

In addition, 5,000 bootstrap analyses with a 95% confidence interval were run to test the statistical significance of the mediating effect. Results (cf. Table 3; Fig. 2) revealed that both the separate mediating roles of basic psychological needs satisfaction and psychological reactance were significant, as was the chain mediation model.

Discussion

In this article, based on the integrative model of engagement, a longitudinal chain mediation model is established using adolescents as subjects. This model explores the impact of parental conflict, as an environmental factor, on academic engagement through two mediators inherent to the adolescents themselves: basic psychological needs satisfaction and psychological reactance. The findings indicate that while parental conflict at T1 showed a significant negative direct effect on adolescents' academic engagement at T2, this direct effect became non-significant after introducing the mediators. Specifically, the effect is fully mediated through both the separate and chain mediation of T1 basic psychological needs satisfaction and T1 psychological reactance.

The relationship between parental conflict and academic engagement

This study found that parental conflict at T1 directly and negatively predicts adolescent academic engagement at T2, supporting H1. This result is consistent with prior studies (Harold et al., 2007; Ghazarian & Buehler, 2010; King & Mrug, 2018; Yang et al., 2022), which consistently indicates that disharmony within the family, such as parental conflict, significantly adversely affects adolescents' academic performance. On one hand, based on the theory of emotional security, adolescents' emotional reactions, behavioral responses, and cognitive appraisals of the parental subsystem during parental conflict collectively contribute to a resultant sense of emotional insecurity (Davies & Cummings, 1994;

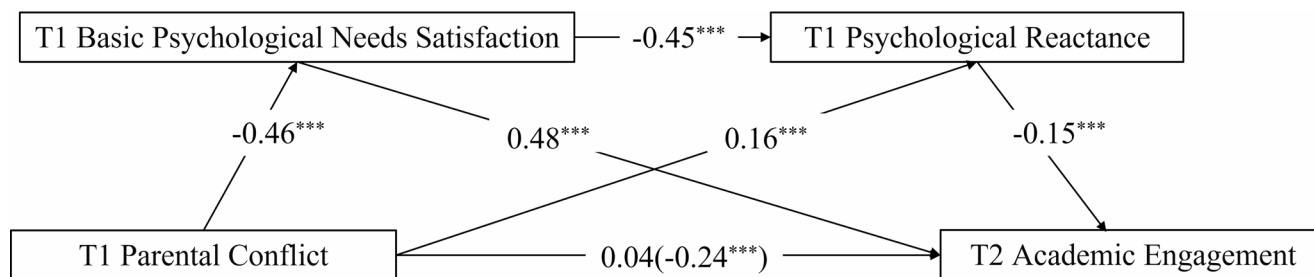


Fig. 2 The chain mediation model (total effect in parentheses). Note. * $p < .05$, ** $p < .01$, *** $p < .001$. All path coefficients were standardized

Cummings & Davies, 2002, 2010; Yang et al., 2022a). In the context of such emotional insecurity, adolescents find it challenging to maintain interest and focus on their studies, naturally diminishing their academic engagement. On the other hand, within the cognitive-contextual framework, parental conflict affects children's emotional processing and cognitive appraisal of conflicts (Grych & Fincham, 1990). When adolescents' psychological resources are consumed in addressing the negative cognitions and emotions induced by parental conflict, their academic performance and engagement inevitably suffer. Additionally, this study found that the direct link between parental conflict and adolescents' academic engagement turned non-significant with the introduction of mediating variables, indicating that this relationship might function conditionally through other factors.

Separate mediating roles of basic psychological needs satisfaction and psychological reactance

This research investigates how basic psychological needs satisfaction and psychological reactance, as separate mediators, influence the relationship between parental conflict and adolescents' academic engagement. The findings reveal that both basic psychological needs satisfaction and psychological reactance can independently serve as complete mediators.

Regarding basic psychological needs satisfaction, this research verifies the mediating role of basic psychological needs satisfaction, which reveals that parental conflict during the T1 period impairs adolescents' basic psychological needs satisfaction, subsequently diminishing their T2 academic engagement, thereby supporting H2, consistent with previous studies (Koçak et al., 2023; Zhen et al., 2017). The family, as a relational system comprising marital and parent-child interactions (Weeland et al., 2021), experiences a "spillover" of tension from parental marital conflicts to parent-child relationships (Erel & Burman, 1995). Such conflicts can manifest in more hostile and negative parenting styles (Li et al., 2011; Gong et al., 2016), thereby exacerbating conflict levels within the entire family system. During this process, parental conflict may undermine parents' basic psychological needs satisfaction (Koçak, 2024), which, in turn, can influence their children's basic psychological need satisfaction through parenting behaviors such as psychological control or autonomy support (van der Kaap-Deeder et al., 2015; Costa et al., 2019a, b), thereby decreasing adolescents' academic engagement (Maralani et al., 2016). Based on this, the reasons for parental conflict causing harm to adolescent basic psychological needs satisfaction in this study can be explained as parents being unable to meet their own basic needs due to conflicts between them, possibly making it difficult to provide the necessary support and

understanding in interactions with their children, thereby affecting the children's basic psychological needs satisfaction. This suggests a hypothesis of intergenerational transmission that merits further exploration in future research.

Regarding psychological reactance, this study indicates that T1 parental conflict exacerbates adolescents' psychological reactance, subsequently reducing their academic engagement at T2, supporting H3. Psychological reactance is considered an aversive state, comprising emotional components (such as feelings of anger) and cognitive components (such as a rejection of authority) (Rains, 2013). In the context of parental conflict, on one hand, adolescents are prone to experiencing intense negative emotions such as pain, fear, sadness, and anger (Van Eldik et al., 2020), which make up the emotional component of reactance. On the other hand, prolonged parental conflict may lead adolescents to develop negative internal representations of their family (Van Eldik et al., 2020), forming the cognitive component of psychological reactance. Additionally, to some extent, psychological reactance can be viewed as an adaptive mechanism for adolescents dealing with parental conflict and stressful environments. Psychological reactance theory posits that when individuals perceive their behavioral freedom as threatened, they generate a motivation to protect their choice and restore freedom (Brehm, 1966). This motivation manifests as psychological reactance in adolescents, meaning that in the face of parental conflict, a stressful environment, adolescents may use reactance to try to protect themselves. Psychological reactance increases the attractiveness of restricted behaviors, thus motivating individuals to repeat these behaviors, which are manifested through cognitive, behavioral, and emotional expressions (Brehm, 1966). This effect is particularly pronounced in adolescents with a high novelty-seeking and low harm-avoidance trait (Moreira et al., 2022). Their novelty-seeking trait drives resistance to constraints, while their low harm-avoidance trait reduces concerns about consequences. When confronted with parental conflict that threaten autonomy, such adolescents will exhibit rebellion by reducing their academic engagement, transforming learning from a growth tool to an expression of autonomy.

Chain mediating role of basic psychological needs satisfaction and psychological reactance

This study also found that between parental conflict and adolescents' academic engagement, the basic psychological needs satisfaction and psychological reactance play chain mediating role. Initially, basic psychological needs satisfaction significantly negatively predicts psychological reactance, consistent with previous findings (Van Petegem et al., 2015) and validated within a Chinese sample. Moreover,

the establishment of the chain mediation model confirms H4 and provides empirical support for the comprehensive model of academic engagement (Wang et al., 2019). From the perspective of adolescents, parental conflict is an environmental factor within the broader family context, while basic psychological needs satisfaction and psychological reactance are closely related individual factors. Parental conflict can thus influence academic engagement through these mediators—by undermining basic psychological needs satisfaction, indirectly triggering psychological reactance, and ultimately exerting a negative impact on adolescents' academic engagement. The possible explanations are as follows. As parental conflict occurs, adolescents may increasingly worry about the stability of their parents' relationship (Grych & Fincham, 1993). When they perceive themselves as responsible for resolving these conflicts but feel incapable of doing so, they may experience helplessness (Wang et al., 2014), which may undermine their sense of competence. According to Family Systems Theory, parental conflict spills over into parent-child interactions, disrupting family dynamics and leading to more negative, controlling, or neglectful parenting (Erel & Burman, 1995; Martin et al., 2017). These patterns weaken adolescents' sense of relatedness and reduce their perceived autonomy within the family. As a result, the frustration of basic psychological needs—particularly competence, autonomy, and relatedness (Deci & Ryan, 2000)—may emerge. When such needs are actively thwarted, adolescents are more likely to exhibit defensive responses, including psychological reactance (Skinner & Edge, 2002; Van Petegem et al., 2015). This reactance reflects attempts to reclaim a sense of self-direction and control, but it may also contribute to negative developmental outcomes, including reduced academic engagement (Van Petegem et al., 2015).

Moreover, the application of a longitudinal design allows this study to overcome the temporal sequencing issues unresolvable in cross-sectional research, thereby more effectively exploring the relationships between variables. Understanding this pathway not only helps to reveal the mechanisms by which parental conflict impacts adolescent development but also highlights key factors that reduce its long-term impact on academic engagement, offering valuable direction for parenting.

Limitations and future research directions

Firstly, this study employed a questionnaire method for data collection, which has certain limitations such as potential respondent bias and social desirability effects that could impact the validity and reliability of the data. Due to the limitations of a short-term longitudinal study design, we cannot make definitive causal inferences. Future research

could supplement or validate the results of this study through experimental or qualitative methods.

Additionally, given that the data for this study were entirely based on adolescents' self-reports, this single data source limitation may affect the objectivity of the research outcomes. To enhance the ecological validity of the research, future studies should consider integrating perspectives from parents or other relevant individuals, achieving cross-verification of results through multi-source data.

Lastly, other factors (such as school-related) may influence adolescent academic engagement. Future research will have to consider a greater number of different variables to look deeper into the way parental conflict influences academic engagement. These will constitute either the mediating effect of parental conflict on academic engagement or the moderating effect that provides a more comprehensive understanding of the dynamics involved.

Conclusion

This study uncovers the longitudinal link and underlying mechanisms connecting parental conflict to diminished adolescent academic engagement. The key findings reveal a significant longitudinal association between parental conflict and adolescent academic engagement, with T1 parental conflict negatively predicting T2 academic engagement. Furthermore, the research establishes basic psychological needs satisfaction at T1 as a crucial mediating mechanism, indicating that parental conflict diminishes adolescents' basic psychological needs satisfaction, which in turn contributes to reduced academic engagement. Psychological reactance at T1 also emerges as an important mediating variable, illustrating how this defense mechanism can have an effect on educational outcomes. What is more, the fact that basic psychological needs satisfaction and psychological reactance are a chain of mediators further emphasizes the complexity of the relationship between environmental factors and educative behaviors. Findings from this current study will help in understanding the mechanisms of how parental conflict affects adolescent academic engagement and will give greater importance to individual psychological factors, offering directions to lessen the negative impact of family discord on adolescent academic engagement.

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Data availability The datasets generated during and/or analyzed during the study are available from the corresponding author upon reasonable request.

Declarations

Ethical approval All the contents of this study have been approved by the Ethics Committee of Hunan Normal University.

Consent statement Participants' parents consented to their children's involvement in this study. All participants signed an informed consent form before completing the surveys. All students participating receive gifts as compensation. All the contents of this study have been approved by the Ethics Committee of the author's institution.

Conflict of interest On behalf of all authors, there are no conflicts of interest to declare.

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