

Factors influencing prosocial behavior among Chinese adolescents: Empathy as a mediator

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Abstract: This study examines the factors influencing prosocial behavior among Chinese adolescents, emphasizing empathy as a mediator within the framework of social learning theory. The research investigates how parental involvement and teacher-student relationships enhance empathy, which, in turn, fosters prosocial behavior. Data were collected through a stratified random sampling of middle schools across five regions of China, resulting in 486 valid responses measured on a 5-point Likert scale. Analysis using SPSS and SmartPLS included descriptive statistics, measurement model evaluation, and structural equation modeling. The findings reveal that both parental involvement and teacher-student relationships significantly improve empathy, positively influencing prosocial behavior. Parental involvement demonstrated a stronger effect than teacher-student relationships. The results of this study highlight the critical roles of family and school environments in promoting emotional and social development, providing insights into the mechanisms underlying adolescent prosocial behavior within the Chinese collectivist culture.

Keywords: Adolescent prosocial behavior, Empathy, Parental involvement, Social learning theory, Teacher-student relationships.

1. Introduction

The importance of prosocial behavior in the development of Chinese adolescents cannot be overstated. Studies have shown that prosocial behavior is closely associated with adolescents' subjective well-being, helping to enhance mental health by mitigating the negative effects of social dominance orientation [1]. Moreover, prosocial behavior contributes to creating a harmonious social environment, such as improving school climate and family relationships, while aligning with the cultural values of collectivism [2, 3]. The prioritisation of understanding and promoting the well-being of adolescents is critical in offering assistance to young folks during this pivotal period of growth and guaranteeing they possess the essential means to flourish [4]. At the relational level, prosocial behavior reduces peer rejection and relational bullying, fostering positive interpersonal interactions [5]. Individual traits, such as psychological resilience and forgiveness, play a crucial role in the development of prosocial behavior, laying a foundation for adolescents' long-term growth [6]. Additionally, prosocial behavior is considered a core factor in adolescent leadership development, aiding in the cultivation of social skills and leadership potential [7]. In conclusion, prosocial behavior not only enhances adolescents' mental health and interpersonal relationships but also plays a vital role in fostering societal harmony and preserving cultural values.

The prosocial behavior of Chinese adolescents is influenced by various factors, spanning domains such as family, school, peer relationships, cultural background, and individual psychological traits. First, the family environment plays a crucial role in the development of adolescents' prosocial behavior.

Positive parental involvement, high-quality parent-child relationships, and the family's socioeconomic status and educational level significantly impact adolescents' prosocial tendencies [8]. Second, the school environment and teacher-student relationships are also vital, as positive teacher-student interactions can promote prosocial behavior by reducing behavioral conflicts and enhancing psychological resilience [9, 10]. Peer relationships exert a similarly important influence, with studies finding that strong peer support not only directly facilitates prosocial behavior but also enhances adolescents' empathy, further reinforcing such behaviors [11]. Moreover, the collectivist cultural context, which emphasizes values such as cooperation and helping others, subtly shapes adolescents' prosocial behavior [2]. Finally, adolescents' psychological traits, such as psychological resilience and empathy, are highly correlated with prosocial behavior. Among these, empathy not only directly fosters prosocial behavior but also plays a critical regulatory role in complex social situations [6]. In summary, adolescents' prosocial behavior results from the interplay of multidimensional factors, highlighting the need for collaboration among families, schools, and society to provide comprehensive support for its development.

Although existing research has explored the importance of prosocial behavior in adolescent development, such as its positive effects on mental health and social adaptation [8] there is a lack of systematic studies on specific factors influencing adolescent prosocial behavior, such as parental involvement and teacher-student relationships. Notably, insufficient attention has been paid to the mechanisms through which these independent variables influence prosocial behavior via empathy as a mediating variable.

Empathy, as a critical psychological foundation of prosocial behavior, has been preliminarily validated in some studies as a mediator in the formation of adolescent behavior. For instance, empathy has been shown to establish a positive link between parent-child attachment and prosocial behavior [11]. However, most research focuses on the influence of peers or the parental role, with limited attention to how teacher-student relationships promote prosocial behavior through empathy. Teacher-student relationships are not only a critical component of adolescent socialization but also hold potential mechanisms of influence on prosocial behavior, such as the development of empathy within teacher-student interactions. This area remains underexplored [9].

Furthermore, the role of Chinese parents is unique, providing an important cultural perspective for this study. In traditional Chinese culture, parents are not only direct caregivers but are also regarded as central figures in moral education, bearing the responsibility of imparting social norms and shaping behavioral patterns [12]. This collectivist cultural context emphasizes the pivotal role of parents in influencing adolescents' psychological development and behavioral regulation. High-quality parental involvement can enhance adolescents' empathy, thereby further promoting their prosocial behavior. However, existing research has yet to adequately explore the connection between this culturally distinct parental role and the development of adolescents' prosocial behavior. In particular, there is a lack of studies examining how parental involvement indirectly influences prosocial behavior through empathy as a psychological mechanism.

This study adopts Social Learning Theory as its theoretical framework to explore how social interactions shape adolescents' prosocial tendencies. Social Learning Theory emphasizes that individuals internalize social norms and behavioral tendencies through observing and imitating significant others' behaviors, combined with their emotional experiences and social feedback [13]. Within this framework, the study focuses on the specific mechanisms by which parental involvement and teacher-student relationships influence adolescents' prosocial behavior via empathy as a mediating variable. As significant others in adolescents' lives, parents and teachers not only directly impact adolescents' behavioral patterns but also facilitate the development of empathy, a core psychological mechanism. Through empathy, adolescents can better understand and perceive others' emotions, thereby fostering the cultivation of prosocial behavior [14].

2. Literature Review and Research Hypothesis

2.1. Adolescents' Prosocial Behavior

Prosocial behavior refers to voluntary actions aimed at benefiting others or society, including specific behaviors such as cooperation, helping, sharing, and comforting. This behavior is typically driven by altruistic motivations but may also be influenced by social norms or rewards [15]. Additionally, it can be shaped by cultural expectations or external incentives [16]. Prosocial behavior holds interdisciplinary importance and is a common research focus in psychology, economics, and sociology.

From the perspective of social psychology, prosocial behavior can be explained through a multi-level lens, including individual-level emotional and cognitive motivations such as empathy, as well as group-level social norms and cultural values [17]. Studies have shown that prosocial behavior enhances social cohesion and effectively promotes harmony among groups in diverse social contexts [18]. Furthermore, prosocial behavior is not only driven by intrinsic motivations but can also be reinforced through external incentive mechanisms, such as economic rewards or social recognition [16]. The significance of prosocial behavior lies in its dual benefits for individuals and society. At the individual level, engaging in prosocial behavior enhances well-being and mental health [19]. At the societal level, it mitigates conflicts, fosters cooperation, and establishes shared interests and trust within diverse societies [18]. Therefore, prosocial behavior plays a pivotal role in both individual development and social progress.

Adolescents' prosocial behavior plays a significant role in their personal development and social adaptation. Research indicates that through cooperation, helping, and sharing, adolescents not only strengthen social connections but also enhance self-esteem and mental health [18]. Furthermore, prosocial behavior is closely associated with a reduction in behavioral problems. Studies have shown that greater engagement in prosocial behaviors significantly reduces adolescents' externalizing behaviors (e.g., aggression) and internalizing problems (e.g., anxiety and depression) [20].

The importance of prosocial behavior also lies in its promotion of moral and emotional development. Through prosocial interactions with peers, adolescents can improve their empathy and sense of social responsibility, laying the groundwork for future social engagement [21]. Additionally, neuroscience research reveals that adolescents' brains activate regions associated with emotional regulation and social cognition when engaging in prosocial behavior. This not only helps them better cope with social stress but also enhances their adaptability in diverse social contexts [22].

2.2. Parental Involvement

Parental involvement refers to parents' behaviors and attitudes that directly or indirectly influence their children's developmental processes through emotional support, behavioral participation, and resource provision. This concept encompasses various forms of engagement, including educational support (e.g., assisting with homework), life guidance (e.g., teaching behavioral norms), and emotional communication (e.g., listening and companionship) [12]. The primary goal of parental involvement is to provide a secure environment for growth through positive parent-child interactions, thereby enhancing children's social-emotional abilities, academic achievements, and behavioral regulation [23].

The importance of parental involvement lies in its critical role in shaping adolescents' psychological development and behavioral norms. Studies have shown that high-quality parental involvement is significantly associated with adolescents' prosocial behavior. Specifically, through emotional support and positive guidance, parental involvement enhances adolescents' empathy, thereby improving their social adaptability and promoting positive behaviors [8]. Furthermore, parental involvement can effectively reduce adolescent behavioral problems by establishing stable family relationships and offering behavioral guidance, which lowers the likelihood of adolescents engaging in antisocial behaviors [9].

In traditional Chinese culture, parents are not only the primary caregivers in their children's upbringing but are also regarded as educators of ethics, morality, and social behavior. This role

underscores the significant influence of parents on adolescents' behavioral regulation, emotional development, and socialization processes [12]. Additionally, Chinese families, rooted in collectivist cultural values, emphasize instilling social responsibility and altruistic values through close parent-child relationships, providing a unique context for fostering prosocial behavior [8]. By actively engaging in their children's lives, parents not only directly nurture prosocial tendencies but also indirectly promote prosocial behaviors by enhancing adolescents' emotional sensitivity and empathy [11]. Furthermore, this study situates its investigation within the context of China's social transformation, focusing on the evolving roles of contemporary parents and their influence on children's behavior. Against the backdrop of rapid urbanization and increasing educational pressures, parental roles have shifted from traditional "authoritarian disciplinarians" to "guides" who prioritize emotional support. This role transition offers an opportunity to explore new forms of parental involvement, such as emotional support and participation in education, within this changing social and cultural landscape [9].

2.3. Empathy

Empathy refers to an individual's ability to understand and perceive the emotions, thoughts, and experiences of others, encompassing two dimensions: affective empathy and cognitive empathy. Affective empathy involves the perception and sharing of others' emotions, while cognitive empathy pertains to the rational analysis and inference of others' feelings and behaviors [24]. The primary function of empathy is to facilitate social interaction and emotional connection by understanding others' emotional states, thereby enhancing the quality of interpersonal relationships and social adaptability [25]. The significance of empathy lies in its central role in psychological development and social behavior. On the one hand, empathy fosters prosocial behavior by enabling individuals to understand others' needs and emotions, thus stimulating helping behaviors and cooperative motivations [26]. On the other hand, as an emotional regulation mechanism, empathy helps individuals better manage conflicts and stress in interpersonal interactions, thereby reducing behavioral problems and psychological distress [11].

Empathy is the ability to understand and perceive others' emotions and perspectives, promoting prosocial behavior by stimulating altruistic actions and cooperative motivations [24]. As a core psychological mechanism, empathy effectively mediates the relationship between parental involvement, teacher-student relationships, and adolescents' prosocial behavior. Studies have shown that positive parenting practices enhance adolescents' empathy, thereby increasing their prosocial behaviors toward both strangers and friends [27]. Moreover, empathy plays a regulatory role in family and peer relationships, helping adolescents make more positive behavioral choices in social contexts [28]. Beyond promoting prosocial behavior, empathy also reduces behavioral problems in adolescents. Research indicates that adolescents' attachment to peers and family can enhance empathy, which not only decreases antisocial behaviors but also strengthens prosocial behaviors toward both animals and humans [29]. Therefore, exploring empathy as a mediating variable helps to uncover the mechanisms through which parental involvement and teacher-student relationships influence adolescents' prosocial behavior. It also provides empirical support for family education and school-based interventions.

The positive influence of parental involvement on adolescents' prosocial behavior has been well-documented in numerous studies. Padilla-Walker and Carlo [30] emphasized that parents, through emotional support and behavioral guidance, help adolescents develop altruistic values and a sense of social responsibility, thereby fostering behaviors such as cooperation, helping, and sharing [26]. According to social learning theory, adolescents internalize prosocial behavior patterns (e.g., helping others) by observing and imitating their parents, and practice these behaviors in daily life [13]. Consistent emotional support and role modeling further enhance adolescents' empathy toward others' needs, thereby increasing their motivation for prosocial behavior. Additionally, cultural context plays a significant moderating role in the impact of parental involvement. In collectivist cultures, parents emphasize cooperation and social responsibility, encouraging adolescents to participate in social activities and fostering their prosocial behavior [8, 12].

Therefore, based on literature and theoretical support, this study proposes the following hypothesis:

H₁: Parental involvement positively influences adolescent prosocial behavior.

Parental involvement has a positive impact on adolescents' empathy, which can be further explained through the lens of Social Learning Theory. Social Learning Theory emphasizes that individuals learn social norms and emotional skills by observing and imitating the behaviors of significant others [13]. In the family environment, parents serve as important role models for adolescents, and their empathetic behaviors provide direct examples for learning. For instance, when parents demonstrate sensitivity and attentiveness to others' emotions, adolescents are more likely to observe and mimic these behaviors, internalizing the values of empathy and enhancing their emotional understanding abilities [27].

Additionally, the emotional support and open communication environment created by parents during parent-child interactions help adolescents understand others' emotions and practice empathy skills. This aligns with the concept of "reinforcement learning" in Social Learning Theory, wherein adolescents' empathy skills are strengthened through positive feedback from parents when they exhibit empathetic behaviors [31].

Moreover, positive parenting practices, such as inductive parenting, are closely linked to the development of empathy. These practices not only assist adolescents in identifying emotional cues in social contexts but also enhance their emotional regulation abilities during social interactions [32].

Within the framework of social learning theory, this study will further validate the critical mechanism by which parental involvement influences empathy, particularly through role modeling and reinforcement learning, to enhance adolescents' emotional development and social adaptation [28]. Therefore, this study proposes the following research hypothesis:

H₂: Parental involvement positively influences empathy.

2.4. Teacher-Student Relationship

The teacher-student relationship refers to the emotional bonds and interaction patterns formed between teachers and students during the processes of learning and social interaction. It typically encompasses three main dimensions: support, trust, and respect [33]. This definition includes both the cognitive and emotional aspects of teacher-student engagement within instructional settings. The primary purpose of the teacher-student relationship is to foster positive interactions that support students' academic achievement and socio-emotional development. Research indicates that a positive teacher-student relationship enhances students' learning motivation and academic performance, while also providing emotional support during academic challenges [34]. Moreover, the teacher-student relationship not only promotes academic outcomes but also plays a critical role in students' mental health and behavioral regulation.

The teacher-student relationship has a significant positive impact on the development of adolescents' empathy, primarily through emotional support, social interactions, and role modeling. A positive teacher-student relationship provides an emotionally secure environment, enabling students to better perceive and understand others' emotions, thereby enhancing their empathy [34]. Moreover, teachers, as significant role models for students, demonstrate understanding and caring behaviors in the classroom, which not only directly promote students' emotional learning but also influence their empathetic abilities during peer interactions through modeling effects [35]. Additionally, a positive teacher-student relationship increases students' school engagement and emotional regulation skills, further strengthening their empathetic performance in various social contexts [36]. Therefore, the teacher-student relationship plays a crucial role in shaping adolescents' empathy. Based on this, the following research hypothesis is proposed:

H₃: Teacher-student relationships positively influence empathy.

Teacher-student relationships are a crucial form of social interaction for adolescents and have been shown to positively influence prosocial behavior. Roorda, et al. [34] pointed out that positive teacher-student relationships provide emotional support and psychological security, fostering emotional development and enhancing adolescents' sensitivity to others' needs, thereby promoting cooperation

and helping behaviors. According to social learning theory, adolescents internalize prosocial behavior patterns by observing and imitating teachers' actions [13]. For instance, Tao, et al. [35] found that students who receive emotional support from teachers are more likely to exhibit helping behaviors.

Additionally, in collectivist cultures, teachers serve as transmitters of moral standards and social values, playing a significant role in guiding students' prosocial behavior [12]. Zhang, et al. [8] further highlighted that positive teacher-student relationships not only enhance academic achievement but also increase students' sense of social responsibility. However, this influence may vary depending on students' emotional sensitivity and teachers' interaction styles [37].

Therefore, based on the above literature and theories, this study proposes the following hypothesis:

H₄: Teacher-student relationships positively influence adolescent prosocial behavior.

Adolescents' empathy significantly and positively influences their prosocial behavior. This influence is primarily reflected in how empathy enhances adolescents' understanding of others' emotions and fosters compassion, thereby stimulating prosocial actions such as helping, cooperation, and care. Research has shown that adolescents with higher levels of empathy are more likely to actively engage in prosocial behaviors, such as supporting peers and contributing to their communities [38].

Moreover, different dimensions of empathy, such as affective resonance and cognitive understanding, are significantly associated with adolescents' prosocial behavior. This connection is facilitated by adolescents' ability to better perceive and respond to the needs of others [38]. Further studies have indicated that empathy not only directly promotes prosocial behavior but also indirectly enhances it by improving adolescents' social cognition and emotional regulation abilities [27].

Based on this, the following hypothesis is proposed in this study:

H₅: Empathy positively influences adolescent prosocial behavior.

2.5. Mediation Analysis

Parental involvement can indirectly promote the development of adolescents' prosocial behavior by enhancing their empathy. Research has shown that positive parental involvement, such as care, support, and active participation in adolescents' lives, significantly improves their emotional resonance and cognitive understanding abilities, which are key components of empathy [27].

Empathy has been identified as a critical bridge connecting parental involvement and adolescents' prosocial behavior. For instance, supportive parental behaviors can enhance adolescents' empathy, further encouraging cooperative, helping, and caring prosocial behaviors [28]. Moreover, positive parental influence within the family environment can increase adolescents' emotional sensitivity, improving their prosocial responsiveness in complex social contexts [29].

Therefore, this study proposes the following hypothesis:

H₆: Empathy mediates the relationship between parental involvement and adolescent prosocial behavior

Positive teacher-student relationships can significantly enhance adolescents' empathy, thereby improving their prosocial behavior. Research indicates that strong supportive teacher-student interactions not only foster students' emotional security but also improve their sensitivity to others' emotions and needs in various contexts, which are essential foundations of empathy [39].

Further empirical studies have demonstrated that emotional support within teacher-student relationships enhances adolescents' emotional regulation abilities, which are closely related to the development of prosocial behaviors. For example, students who feel cared for and trusted in their relationships with teachers are more likely to develop helping and cooperative behaviors, which are directly driven by empathy [40]. Additionally, empathy, as a key mediator between teacher-student relationships and prosocial behavior, has been shown to significantly reduce adolescents' emotional and behavioral problems while improving their social adaptability [28].

Therefore, this study proposes the following hypothesis:

H₇: Empathy mediates the relationship between teacher-student relationships and adolescent prosocial behavior.

Figure 1 shows the framework of this study.

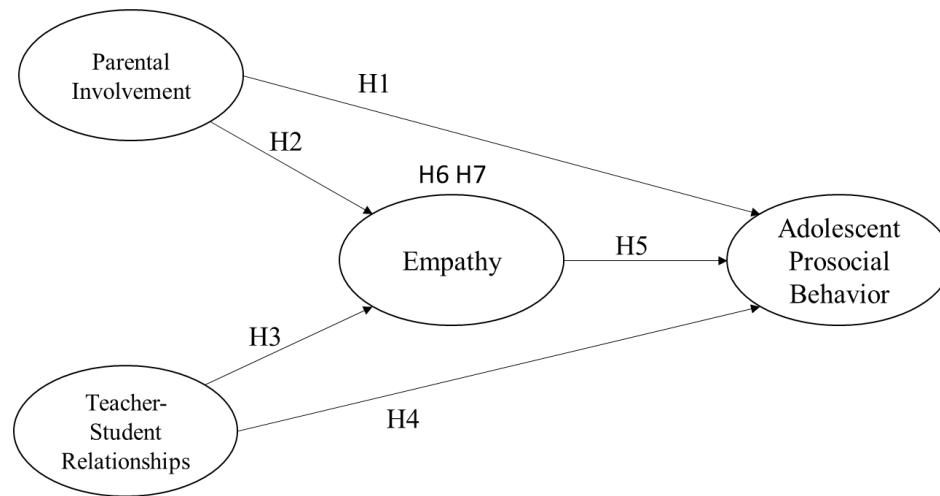


Figure 1.
Research framework diagram.

3. Research Methods

This study adopts a quantitative research approach, primarily due to its efficiency and suitability for hypothesis testing. Quantitative research enables the collection of standardized data through structured tools (e.g., surveys), allowing systematic analysis of the relationships between parental involvement, empathy, and adolescents' prosocial behavior, as well as the quantification of variable effects [41]. Moreover, it facilitates the processing of large sample data, enhancing the representativeness and reliability of results, and supports statistical testing of multiple hypotheses. This study employs structural equation modeling (SEM) for path analysis, effectively examining direct and indirect effects while quantifying the mediating role of empathy, providing empirical support for the influence of parental involvement on adolescents' prosocial behavior.

3.1. Sampling Technique

The participants of this study were Chinese adolescents, including middle and high school students (ages 13 to 18) from urban and rural schools across Eastern, Southern, Central, Western, and Northeastern regions of China. To ensure sample representativeness and data reliability, stratified random sampling was adopted. First, the five major geographic regions of China were stratified, and two cities were randomly selected from each region. From each city, two schools (one urban and one rural) were randomly chosen, resulting in a total of 20 middle schools. The selected schools were contacted to explain the study's purpose and survey procedures, and their assistance was requested in distributing questionnaires to students. Each school aimed to collect 30 completed questionnaires. Data collection took place from August 1 to August 31, 2024, yielding 542 completed questionnaires. After excluding invalid responses, 486 valid questionnaires were obtained. According to the sample size calculation formula provided by the Survey System website, with a 95% confidence level and a 5% margin of error, the minimum required sample size for a population of 93.4578 million middle and high school students in China is 384. The final sample size of this study exceeds this minimum requirement, ensuring statistical representativeness and reliability for data analysis.

3.2. Research Instrument

This study employs a structured questionnaire to measure four main constructs: parental involvement, teacher-student relationship, empathy, and adolescent prosocial behavior. All constructs

are assessed using a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). The measurement items for parental involvement, teacher-student relationship, empathy, and prosocial behavior are adapted from validated scales in previous studies and appropriately adjusted to ensure their applicability and reliability.

The reliability and validity of the measurement tools were verified through multiple processes. First, expert reviews were conducted to ensure the cultural and contextual relevance of the scales. Second, a pilot test involving 50 adolescents was carried out, and feedback was used to refine the wording of the items. Reliability testing showed that Cronbach's α values for all constructs ranged from 0.83 to 0.94, indicating good internal consistency. Additionally, confirmatory factor analysis (CFA) was conducted to confirm the structural validity of the scales, with all factor loadings exceeding 0.70 and good model fit indices.

3.3. Analysis Techniques

The data analysis in this study is divided into three stages: descriptive statistics, measurement model assessment, and structural model analysis, with SPSS and SmartPLS 4.0 used as the statistical tools.

First, in the descriptive statistics stage, SPSS will be used to analyze the demographic characteristics of the sample and the mean, standard deviation, skewness, and kurtosis of the research variables, to examine the distribution and rationality of the data, providing a foundation for subsequent analysis.

Next, in the measurement model assessment stage, SmartPLS 4.0 will be used to assess the reliability and validity of the scales. Internal consistency will be evaluated using Cronbach's Alpha and composite reliability (CR), and convergent validity will be tested using average variance extracted (AVE) [42]. Discriminant validity will be assessed using the Fornell-Larcker criterion to ensure the measurement quality of the scales [43]. Finally, in the structural model analysis stage, SmartPLS 4.0 will be used to test the goodness of fit of the model, and path analysis will be conducted to examine the structural relationships and their significance. Additionally, the significance of mediation and moderation effects will be tested using the bootstrap method [44].

4. Research Results

4.1. Analysis of Demographic Data

The majority of the participants were male, with 251 participants (51.6%); in terms of age, the 13-14 age group was predominant, with 168 participants (34.6%); geographically, the majority came from the Southeast (Eastern) region, with 202 participants (41.6%); and in terms of urban/rural distribution, most participants were from urban areas, with 305 participants (62.8%), as shown in Table 1.

Table 1.
Analysis of Personal Demographic Information.

Category	Group	Frequency Distribution	Percentage
Gender	Male	251	51.6%
	Female	235	48.4%
Age	13-14	168	34.6%
	15-16	158	32.5%
	17-18	160	32.9%
Region	Southeast (Eastern) Region	202	41.6%
	Central Region	122	25.1%
	Western Region	121	24.9%
	Northeast Region	41	8.4%
Urban/Rural	Urban	305	62.8%
	Rural	181	37.2%

4.2. Convergent Validity

According to the criteria proposed by Fornell and Larcker [43], the measurement model's validity should meet the following standards: factor loadings should be greater than 0.7, composite reliability (CR) should exceed 0.7, average variance extracted (AVE) should be greater than 0.5, and Cronbach's α coefficient should be greater than 0.7. In this study, the factor loadings for each construct ranged from 0.774 to 0.918, exceeding the threshold of 0.7. The composite reliability values ranged from 0.948 to 0.957, indicating good internal consistency. The average variance extracted (AVE) ranged from 0.679 to 0.793, all exceeding the 0.5 standard. The Cronbach's α coefficients for the constructs ranged from 0.935 to 0.951, which are significantly higher than the critical value of 0.7. Based on these results, the measurement model in this study exhibits convergent validity, as shown in Table 2.

Table 2.
Convergent Validity Analysis Table.

Construct	Item	Factor Loading	Cronbach's alpha	Composite Reliability	Average Variance Extracted (AVE)
Adolescent Prosocial Behavior	APB1	0.838	0.947	0.955	0.679
	APB2	0.774			
	APB3	0.815			
	APB4	0.791			
	APB5	0.801			
	APB6	0.815			
	APB7	0.868			
	APB8	0.826			
	APB9	0.801			
	APB10	0.901			
Empathy	EMP1	0.898	0.936	0.948	0.723
	EMP2	0.833			
	EMP3	0.833			
	EMP4	0.840			
	EMP5	0.817			
	EMP6	0.869			
	EMP7	0.858			
Parental Involvement	PIN1	0.913	0.935	0.950	0.793
	PIN2	0.918			
	PIN3	0.890			
	PIN4	0.886			
	PIN5	0.842			
Teacher-Student Relationships	STR1	0.867	0.951	0.957	0.692
	STR2	0.824			
	STR3	0.851			
	STR4	0.855			
	STR5	0.801			
	STR6	0.829			
	STR7	0.807			
	STR8	0.810			
	STR9	0.838			
	STR10	0.836			

4.3. Discriminant Validity

For conceptually similar constructs: HTMT < 0.90 [42]. The HTMT values between the constructs are all less than 0.90, which meets this criterion and indicates that the model has discriminant validity, as shown in Table 3.

Table 3.
HTMT Discriminant Validity Analysis.

	Adolescent Prosocial Behavior	Empathy	Parental Involvement	Teacher-Student Relationships
Adolescent Prosocial Behavior				
Empathy	0.552			
Parental Involvement	0.380	0.481		
Teacher-Student Relationships	0.284	0.355	0.470	

4.4. Goodness of Fit (GOF)

The Goodness of Fit (GOF) is an overall measure of model fit, with thresholds of 0.1 indicating weak fit, 0.25 indicating moderate fit, and 0.36 indicating strong fit [45]. The GOF result for this study is 0.438, indicating a strong level of model fit.

$$GOF = \sqrt{AVE} \times \sqrt{R^2} = \sqrt{0.723 \times 0.265} = 0.438$$

4.5. Path Analysis

The path coefficient for Parental Involvement \rightarrow Empathy is 0.383 with a standard deviation of 0.046, (t -value = 8.355, p -value = 0.000 < 0.05). This shows that Parental Involvement has a significant positive effect on Empathy.

The path coefficient for Teacher-Student Relationships \rightarrow Empathy is 0.168 with a standard deviation of 0.045, (t -value = 3.753, p -value = 0.000 < 0.05). This suggests that Teacher-Student Relationships have a significant positive effect on Empathy.

The path coefficient for Empathy \rightarrow Adolescent Prosocial Behavior is 0.522 with a standard deviation of 0.040, (t -value = 13.09, p -value = 0.000 < 0.05). This indicates that Empathy has a significant positive effect on Adolescent Prosocial Behavior, as shown in Table 4 and Figure 2.

Table 4.
Path Analysis Table.

Path relationship	Original sample (O)	Standard deviation (STDEV)	t statistics (O/STDEV)	p values
H1: Parental Involvement \rightarrow Adolescent Prosocial Behavior	0.119	0.052	2.302	0.021
H2: Parental Involvement \rightarrow Empathy	0.374	0.047	8.038	0.000
H3: Teacher Student Relationships \rightarrow Empathy	0.180	0.045	4.042	0.000
H4: Teacher Student Relationships \rightarrow Adolescent Prosocial Behavior	0.089	0.039	2.257	0.024
H5: Empathy \rightarrow Adolescent Prosocial Behavior	0.437	0.044	9.968	0.000

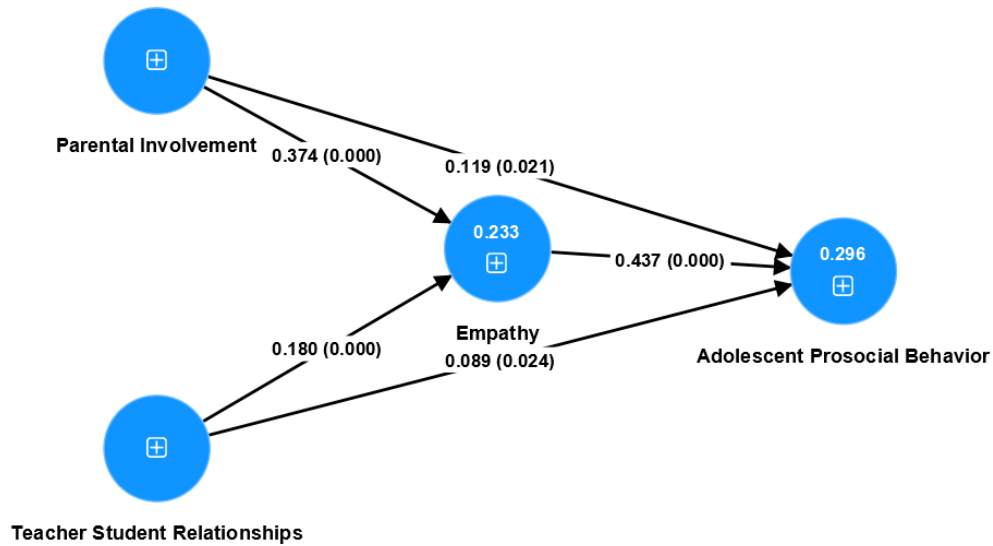


Figure 2.
PLS-SEM Statistical Model Diagram.

4.6. Mediation Effects

The mediation analysis revealed significant indirect effects for both pathways, confirming the mediating role of empathy in the relationship between parental involvement, teacher-student relationships, and adolescent prosocial behavior.

4.6.1. Parental Involvement → Empathy → Adolescent Prosocial Behavior

p -value: <0.05, Confidence Interval: [0.115, 0.217]

The confidence interval does not include 0, indicating a significant mediating effect. This demonstrates that parental involvement positively influences adolescent prosocial behavior through enhanced empathy.

4.6.2. Teacher-Student Relationships → Empathy → Adolescent Prosocial Behavior

p -value: <0.05, Confidence Interval: [0.040, 0.125]

The confidence interval does not include 0, confirming a significant mediating effect. This indicates that positive teacher-student relationships enhance adolescent prosocial behavior indirectly via empathy, as shown in Table 5.

Table 5.
Mediation Effects Analysis.

Mediation Effects	Original sample (O)	Standard deviation	<i>t</i> statistics	<i>p</i> values	2.50%	97.50%
H6: Parental Involvement → Empathy → Adolescent Prosocial Behavior	0.163	0.026	6.211	0.000	0.115	0.217
H7: Teacher-Student Relationships → Empathy → Adolescent Prosocial Behavior	0.079	0.022	3.631	0.000	0.040	0.125

Based on the results of the mediation analysis, the current research model demonstrates complete mediation [46] as no direct effects were hypothesized or observed between parental involvement, teacher-student relationships, and adolescent prosocial behavior [47]. Empathy fully mediates these relationships, meaning that the effects of parental involvement and teacher-student relationships on prosocial behavior occur exclusively through empathy.

5. Conclusion and Discussion

5.1. Research Findings

5.1.1. The Influence of Parental Involvement and Teacher-Student Relationships on Adolescent Prosocial Behavior

The results of this study indicate that both parental involvement and teacher-student relationships have a significant positive impact on adolescent prosocial behavior, supporting hypotheses H1 and H4. These findings align with existing literature and further validate social learning theory Bandura [13]. When parents provide emotional support and behavioral guidance, they effectively promote adolescents' cooperation, helping, and sharing behaviors [26, 27]. Furthermore, in a collectivist cultural context, parents emphasize group cooperation and social responsibility, further enhancing adolescents' prosocial behavior [8, 12].

Similarly, positive teacher-student relationships also influence adolescent prosocial behavior. Supportive relationships between teachers and students provide emotional security and psychological support, increasing students' sensitivity to others' needs, thereby fostering helping behaviors [35, 37]. In collectivist cultures, teachers play a crucial role as conveyors of moral and social values, further guiding students toward prosocial behavior [8, 12].

However, the impact of parental involvement is greater than that of teacher-student relationships (path coefficient $0.119 > 0.089$). This may be due to the fact that the family serves as the earliest and most continuous socialization environment for adolescents, making parental behaviors and values more likely to be internalized as long-term habits. In contrast, the influence of teacher-student relationships may be moderated by factors such as the frequency of interactions, individual differences among students, and the school environment [37]. Additionally, the effects of teacher-student relationships may be more short-term, depending on students' emotional sensitivity and the nature of teacher interactions [35].

In conclusion, this study confirms that both parental involvement and teacher-student relationships contribute to the development of adolescent prosocial behavior, but parental influence is more fundamental. Schools can serve as a complementary and reinforcing mechanism, working alongside families to foster adolescents' prosocial behaviors.

5.1.2. The Influence of Parental Involvement and Teacher-Student Relationships on Empathy

This study examined the impact of parental involvement and teacher-student relationships on adolescents' empathy, revealing that both have a significant positive influence, supporting hypotheses H2 and H3 and validating social learning theory [13]. Among these factors, parental involvement had a stronger impact (path coefficient 0.383) than teacher-student relationships (path coefficient 0.168), highlighting the central role of the family in adolescent emotional development. Parents enhance adolescents' ability to understand and perceive others' emotions through emotional support, behavioral engagement, and role modeling, aligning with the findings of Padilla-Walker and Christensen [27] and Carrizales, et al. [28]. Additionally, in a collectivist cultural context, families serve as the primary source of emotional development, and positive parenting practices further strengthen adolescents' social adaptation skills [8, 12].

Teacher-student relationships also contribute to adolescent empathy by providing emotional support and behavioral modeling [34, 35]. Teachers' understanding and care create a sense of emotional security, enhancing students' emotional sensitivity. However, the influence of teacher-student relationships is more indirect and constrained by interaction time and the school environment [35]. In contrast, the continuous interaction between parents and adolescents results in a more profound and lasting impact.

In conclusion, this study confirms that both parental involvement and teacher-student relationships enhance adolescent empathy, but parental influence is more significant. These findings further validate the central role of the family in adolescent emotional development within the Chinese cultural context.

5.1.3. *The Influence of Empathy on Adolescent Prosocial Behavior*

This study examined the impact of adolescent empathy on prosocial behavior, revealing a significant positive relationship, supporting hypothesis H3. This finding indicates that adolescents with higher empathy are more likely to exhibit cooperation, helping, and sharing behaviors in daily life.

The results align with McMahon, et al. [38] and Padilla-Walker and Christensen [27] confirming that empathy is a key predictor of adolescent prosocial behavior, enhancing their awareness of and responsiveness to others' needs. Furthermore, empathy facilitates prosocial behavior by improving social cognition and emotional regulation skills. The high path coefficient observed in this study suggests a strong influence, particularly in China's collectivist cultural context, where social responsibility and interpersonal relationships further reinforce the link between empathy and prosocial behavior.

In conclusion, this study confirms that empathy is a crucial driver of adolescent prosocial behavior and validates its amplified effect within collectivist cultures, providing empirical support for understanding the mechanisms of adolescent social behavior.

5.1.4. *The Influence of Parental Involvement and Teacher-Student Relationships on Adolescent Prosocial Behavior Through Empathy*

This study examined the indirect effects of parental involvement and teacher-student relationships on adolescent prosocial behavior through empathy, revealing that both mediation effects were significant. Among them, parental involvement had a stronger indirect impact, indicating that parents enhance adolescent prosocial behavior more profoundly by fostering empathy.

This finding aligns with Padilla-Walker and Christensen [27] supporting the crucial role of parental emotional support and role modeling in strengthening adolescents' emotional resonance and cognitive understanding [28]. Additionally, a stable family environment provides long-term influence, further reinforcing prosocial behavior [29]. In contrast, while the indirect effect of teacher-student relationships was also significant, it was weaker, likely due to limited interaction time in school settings, making its impact less sustained compared to family influence [40]. Nevertheless, supportive teacher-student interactions still play a role by fostering emotional security and behavioral modeling, contributing to adolescent empathy and prosocial behavior [39].

Moreover, China's collectivist culture places a strong emphasis on family as the core of moral education and behavioral norms, further amplifying the role of parental involvement in shaping adolescent empathy and prosocial behavior. In contrast, teacher-student relationships mainly serve as supplementary influences in academic and social domains. These findings align with the cultural context, confirming the critical role of family in adolescent emotional and behavioral development.

5.2. *Research Discussion*

5.2.1. *Academic Contributions*

This study makes several significant contributions to the field of adolescent emotional development and prosocial behavior. First, it systematically validates the mechanisms by which parental involvement and teacher-student relationships influence adolescents' prosocial behavior through empathy, expanding the theoretical framework linking social support, emotional development, and behavioral outcomes. Second, conducted within the context of Chinese culture, this research emphasizes the unique role of collectivist values in shaping prosocial behavior, providing empirical evidence for adolescent emotional and behavioral studies in non-Western cultural settings. Lastly, the findings highlight the distinct roles of family and school in fostering adolescents' empathy and prosocial behavior, offering practical insights for educational interventions and policy design, particularly in promoting coordinated family-school collaborative efforts to support adolescent development.

5.2.2. Practical Recommendations

The findings of this study provide valuable practical recommendations for both family and school education. First, parents should actively engage in adolescents' lives by offering emotional support, behavioral guidance, and serving as role models to foster empathy development and enhance prosocial behavior. Strategies include fostering open communication between parents and adolescents, participating together in meaningful activities, and addressing conflicts in a positive manner.

Second, schools should focus on improving the quality of teacher-student relationships by equipping teachers with the skills to provide emotional support and understanding. Creating a safe and trusting school environment can help students develop emotional sensitivity and a sense of social responsibility. Schools can implement dedicated emotional education programs to enhance students' empathy and provide professional development opportunities for teachers to strengthen their capacity for emotional support.

Additionally, collaboration between families and schools should be reinforced to establish a comprehensive support system. Through coordinated family-school initiatives, efforts can align to promote the healthy emotional and behavioral development of adolescents. These practical recommendations aim to achieve synergy between family, school, and society, offering holistic support for fostering prosocial behavior in adolescents.

5.2.3. Research Limitations and Future Directions

This study validates the mechanism through which parental involvement and teacher-student relationships influence adolescent prosocial behavior via empathy; however, several limitations remain. First, the cross-sectional design limits the ability to establish causality. Future research should adopt a longitudinal approach to verify the model's directional relationships. Second, as the sample consists primarily of Chinese adolescents, cross-cultural studies are needed to examine potential cultural differences in these effects. Additionally, this study relies solely on quantitative measures, without considering factors such as family structure or teacher-student interaction patterns. Future research should incorporate qualitative methods, such as interviews and observations, to capture contextual influences. Lastly, the model focuses only on empathy as a mediating variable, without accounting for other potential factors such as peer influence or self-regulation abilities. Expanding the model to include these aspects could provide a more comprehensive understanding. Addressing these limitations will contribute to a deeper insight into adolescent emotional and behavioral development, offering stronger empirical support for policy and intervention strategies.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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