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A Study on the Mechanisms Underlying the Influence of Home-School Support on Adolescents' Prosocial Behaviour: An Analysis of the Moderating Effects of Risk Factors

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Abstract: Drawing on data from the China Education Panel Study (CEPS), this study systematically examines the mechanisms through which home-school support influences adolescents' prosocial behaviour. Using principal component analysis to construct a composite measure of home-school support, the findings reveal that: (1) home-school support has a significant positive predictive effect on adolescents' prosocial behaviour; (2) In the pathway from home-school support to adolescents' prosocial behaviour, positive psychology plays a mediating role, while negative cognition serves as a moderator;(3) Risk sources generate heterogeneous moderating effects on the association between home-school support and prosocial behaviour. Specifically, school-related risks significantly strengthen the promotional effect of home-school support; however, the moderating interaction between home-school support and family risk is statistically insignificant at the 5% level($p=0.084$), despite the significant main effect of family risk itself. The study reveals the differentiated mechanisms of home-school support, providing empirical evidence for the implementation of targeted school-based interventions.

Keywords: Home-school Support, Prosocial Behaviour, Sources of Risk, Moderating Effect, Mediating Effect.

1. Introduction

Against the dual backdrop of preventing school bullying and promoting the positive development of adolescents, how to effectively foster prosocial behaviour has become a key issue in educational research[1]. As the core microsystems of adolescent development, the integrated effects and mechanisms of the supportive environments provided by families and schools urgently require in-depth exploration. However, existing research still faces three pressing issues:

Firstly, the synergistic effects of home and school support remain unclear. Existing studies have largely examined family and school support in isolation[5], failing to fully reflect their synergistic role in adolescents' daily lives. Ecosystem theory emphasises the interactive influences of different environmental systems; supportive factors from both home and school may produce a synergistic effect where '1+1>2'.To examine this conjecture empirically, this study constructs the interaction term of mean-centered family support and school support in regression analysis. Secondly, there is theoretical controversy regarding the underlying psychological mechanisms.Positive psychology has been extensively validated as a positive mediator, but the mechanism of negative cognition remains contentious: the 'Social Heuristics Hypothesis (SHH)' posits that negative cognition inhibits prosocial behavior[17], whilst the 'Altruism from Adversity Hypothesis' suggests that adversity may stimulate prosocial tendencies[15].Thirdly, the moderating role of risk sources has not been empirically tested. Educational practice urgently requires an answer to the question: when students face different primary sources of risk (home vs. school), are there systematic differences in the effects of home-school support? Based on this, this study constructs an integrated analytical framework to systematically explore the mechanisms through which home-school support influences prosocial behaviour across three levels: main effects, mediating mechanisms, and moderating effects.

2. Literature Review and Research Hypotheses

2.1. Main Effects of Home-School Support

The development of prosocial behaviour requires a nurturing, supportive environment[10]. At the family level, positive parent-child communication provides adolescents with emotional security and behavioural role models; warm family companionship reinforces a sense of belonging; and appropriate parental supervision establishes boundaries for behavioural norms[8] .Research by Wu Su-fen (2024) confirms that parental investment indirectly promotes prosocial behaviour by enhancing empathy[4].

At the school level, teacher support provides students with social reference points and emotional support[14], peer support creates peer norms that reinforce prosocial behavior[12], and home-school collaboration ensures consistency in educational expectations[9]. Research by Tian Kexin et al. (2025) on upper-primary school pupils confirmed that positive teacher-pupil relationships significantly and positively predict pupils' prosocial behaviour, indicating that good teacher-pupil interaction is a key factor in promoting pupils' positive social development within the school environment[13]. Furthermore, Yin Xiaolan et al. (2023) found that the school environment promotes prosocial behaviour among rural left-behind children by enhancing psychological capital[2].

The key theoretical breakthrough lies in the integrative perspective. The family and the school are not isolated

systems, but rather an integrated whole characterised by mutual interpenetration and synergy. When the family provides an emotionally secure base and the school offers a platform for social recognition, the two form an 'emotional-social' dual support system, which may generate synergistic effects. Therefore, we propose:

H1: Integrated home-school support has a significant positive predictive effect on adolescents' prosocial behaviour.

2.2. Dual Mediation of Psychological Mechanisms

Positive psychology serves as a mediator because posituve psychological capital theory posits that self-efficacy, hope, optimism and resilience constitute a developable positive state[11]. Home-school support promotes prosocial behaviour by providing experiences of success (enhancing self-efficacy), presenting a positive future (strengthening hope), fostering a positive interpretative style (cultivating optimism), and providing coping resources (developing resilience). Shi Jindan and Liu Jingyan (2024)[3] confirmed that psychological capital fully mediates the relationship between family functioning and prosocial behaviour.

Negative cognition may produce a masking effect due to theoretical divergence. On the one hand, the General Stress Theory posits that environmental risks trigger negative automatic thoughts, which may subsequently lead to problematic behaviour; on the other hand, the 'Altruism from Suffering Hypothesis' suggests that experiences of adversity may enhance empathic sensitivity towards others, thereby leading to prosocial behaviour.Such prosocial behaviour may fall under the category of 'pathological altruism', characterised by self-sacrifice[16]. Consequently, negative cognition may exert a complex mediating effect between home-school support and prosocial behaviour. Based on this, we propose:

H2: Positive psychology and negative cognition exert a dual mediating effect between home-school support and prosocial behaviour, wherein positive psychology acts as a positive mediator, whilst negative cognition may exhibit a masking effect.

2.3. Moderating Effects of Risk Sources

Why might the source of risk exert a moderating effect? Family risks and school risks differ fundamentally in nature, mechanisms of action, and the difficulty of intervention:

(1) Differences in the nature of risks: Family risks (e.g. parent-child conflict, parental discord) primarily undermine adolescents' emotional security systems, and their impact is often profound and pervasive[7]; school risks (e.g. academic pressure, peer rejection) primarily impact social identity systems, and their influence is relatively direct[6].

(2) Differences in mechanisms of action: Family risks influence adolescents' adaptation to the school environment through 'spillover effects', potentially undermining their ability to benefit from school support; school risks, by contrast, operate relatively independently, and school support may exert a more direct influence.

(3) Differences in intervention difficulty: School-related risks are more controllable, and school support can act directly on the source of risk; family risks originate from the non-school environment, and school support interventions are 'indirect', meaning their effectiveness may be limited.

Based on these differences, this study posits that the source of risk may moderate the effects of home-school support. Specifically, when the primary risks faced by students originate from the school, the effects of home-school support may be stronger, as the support measures are better aligned with the risk issues. Therefore, it is proposed that:

H3: The source of risk moderates the relationship between home-school support and prosocial behaviour; compared to family-related risks, school-related risks enhance the promotional effect of home-school support on prosocial behaviour.

3. Research Design

3.1. Data and Sample

This study utilises data from the China Education Panel Study (CEPS) project conducted by the China Survey and Data Centre. The survey systematically sampled 438 classes from 112 junior secondary schools across 28 county-level administrative regions nationwide, completing a baseline survey of 19,487 junior secondary students.During the follow-up phase in the 2014–2015 academic year, follow-up data were successfully obtained from 9,449 students from the original sample, supplemented by a sample of 471 Year 8 students, yielding a total of 9,920 valid observations.Given that the 2014–2015 follow-up data examined students' negative cognitions and positive psychological states, which aligns with the research objectives, the data from the 2014–2015 academic year was selected for empirical analysis. After excluding samples containing missing values, a final total of 9,522 valid observations were obtained.

3.2. Measurement of Variables

3.2.1. Dependent Variable: Prosocial Behaviour

A composite measurement index was adopted, comprising three dimensions: altruism, compliance and trait-related behaviour.

3.2.2. Core Independent Variable: Composite Index of Home-School Support

A composite index was constructed based on principal component analysis. The analysis revealed that the six support variables could be summarised into six principal components. The first principal component (Comp1) had an eigenvalue of 2.148 and explained 35.8% of the variance, serving as the composite index for home-school support. The loadings for each variable are shown in Table 1:

Table 1. Factor Loadings of Home-School Support Indicators

Family communication	0.535
Family support	0.402
Parental supervision	0.449
Home-school collaboration	0.082
Teacher support	0.432
Peer support	0.396

Note: The first principal component accounts for 35.8% of the variance

3.2.3. Moderating Variables: Primary Sources of Risk

Two continuous variables were constructed:

Family risk level: standardised total score of parent-child conflict and parental discord indicators

School risk level: standardised total score of academic pressure, social anxiety at school, and negative peer influence

By comparing the two risk scores, identify students' tendencies regarding their primary sources of risk.

3.2.4. Mediating Variables

Positive psychology: A composite indicator comprising four dimensions: self-efficacy, hope, optimism and resilience

Negative Cognition: Measured using items related to negative automatic thoughts

3.2.5. Control Variables

To eliminate the interference of demographic factors on the research results, this study included gender, household registration, mode of schooling and only-child status as control variables. First, an independent samples t-test was used to analyse differences in adolescents' prosocial behaviour across the aforementioned variables. The results indicated that there were significant differences in prosocial behaviour scores based on gender, household registration and mode of schooling ($p<0.05$)[5], whilst the only-child status did not yield significant differences across certain dimensions. Consequently, in the subsequent mediation and latent profile analyses, these demographic variables were incorporated into the models as control variables to ensure the robustness of the research findings.

3.3. Analytical Methods

3.3.1. Main Effect Test

Multivariate linear regression analysis was employed to test the main effect of home-school support on prosocial behaviour, testing H1:

$$\text{Prosocial behaviour} = \beta_0 + \beta_1\text{Home-school support} + \sum\delta\text{Control variables} + \varepsilon$$

The mean-centered interaction term of family support and school support is incorporated into regression models to verify the potential synergistic relationship between two types of supportive resources.

3.3.2. Testing for Mediation Effects

Using Hayes's (2013) PROCESS macro (Model 4), we tested the dual mediating effects of positive psychology and negative cognition to test H2:

(1) Control for demographic variables

(2) Conduct 5,000 bootstrap repetitions

(3) Calculate the 95% confidence interval for the indirect effect

3.3.3. Moderation Effect Test

Construct a moderation model to test H3:

$$\text{Prosocial behaviour} = \beta_0 + \beta_1\text{Home-school support} + \beta_2\text{Risk sources} + \beta_3(\text{Home-school support}\times\text{Risk sources}) + \sum\delta\text{Control variables} + \varepsilon$$

Where:

Risk sources: The relative intensity of family and school risks is used as the moderating variable

The significance of the interaction term β_3 reflects the moderating effect

3.3.4. Conditional process analysis

Combining moderation and mediation effects, we examine differences in the mediation path under different risk source conditions:

(1) Divide the sample into high and low groups based on risk source propensity

(2) Conduct mediation analyses separately

(3) Compare the strength of the mediating effects across the different groups

4. Analysis Results

4.1. Descriptive Statistics and Correlation Analysis

Table 2 shows that home-school support is significantly positively correlated with prosocial behaviour ($r = 0.476$, $p < 0.001$), positively correlated with positive psychology ($r = 0.381$, $p < 0.001$), and negatively correlated with negative cognition ($r = -0.133$, $p < 0.001$), laying the foundation for subsequent analyses.

Table 2. Descriptive statistics and correlation matrix of main variables (N=9,522)

Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) prosocial	1.000				
(2) positive_psychology	0.392***	1.000			
	(0.000)				
(3) negative_cognition	-0.088***	-0.*207***	1.000		
	(0.000)	(0.000)			
(4) overall_support	0.476***	0.*381***	-0.*133***	1.000	
	(0.000)	(0.000)	(0.000)		
(5) overall_risk	-0.*389***	-0.*384***	0.*277***	-0.*574***	1.000
	(0.000)	(0.000)	(0.000)	(0.000)	
*** p<0.01, ** p<0.05, * p<0.1					

4.2. Main Effects Test: Support for H1

The results of the multiple regression analysis (Table 3) indicate that, after controlling for demographic variables, the predictive effect of home-school support on prosocial behaviour is significant ($\beta = 0.412$, $p < 0.001$). The model's explanatory power increased from 7.3% to 28.1%, with $\Delta R^2 = 0.208$ ($p < 0.001$), supporting H1.

Table 3. Regression of the main effect of home-school support on prosocial behaviour

Variable	β	SE	t	p
Gender (Female = 1)	0.162	0.018	9.00	<0.001
Household registration (urban = 1)	0.072	0.019	3.79	<0.001
School attendance (boarding = 1)	-0.028	0.020	-1.40	0.162
Parental and school support	0.412	0.009	45.78	<0.001
R^2	0.281			
F	265.34			

Further regression analysis is conducted to test the synergistic effect, as presented in Table 4. After controlling for demographic variables, both family communication and teacher support show significantly positive correlations with prosocial behaviour. The interaction coefficient between these two variables reaches statistical significance (β = 0.054, p = 0.014). This indicates that favourable parent-child communication can reinforce the positive effect of teachers'support, which demonstrates the "1+1>2" synergistic complementary effect.

Table 4. Regression results of family communication, teacher support and their interaction term

Variable	β	Std. Error	t	P>|t|
Family communication	0.3874941	0.0148489	26.10	<0.001
Teacher support	0.2984792	0.0116511	25.62	<0.001
Family communication × Teacher support	0.0542952	0.0219919	2.47	0.014
Constant	3.711343	0.0439255	84.49	<0.001
R-squared	0.1967	—	—	—
F value	309.43	—	—	<0.001

4.3. Testing the Dual Mediation Effect: Support for H2

The results of the PROCESS analysis are shown in Figure 1. home-school support influences prosocial behaviour via two pathways:

(1) Positive psychological pathway: Support → Positive psychological state (0.394) → Prosocial behaviour (0.285)

(2) Negative cognitive pathway: Support → Negative cognition (-0.146) → Prosocial behaviour (0.032)

Bootstrap tests indicate (Table 5) that the indirect effect of positive psychology is 0.112 (95% CI [0.102, 0.123]), whilst the indirect effect of negative cognition is -0.005 (95% CI [-0.009, -0.001]).The negative cognition path exhibited a masking effect (the indirect effect had the opposite sign to the direct effect), supporting H2.

Table 5. Bootstrap test for mediating effects

Path	Effect Size	Boot SE	Lower limit of 95% CI	Upper limit of 95% CI
Total indirect effect	0.107	0.006	0.095	0.119
Positive psychological pathways	0.112	0.005	0.102	0.123
Negative cognitive pathway	-0.005	0.002	-0.009	-0.001
Direct effect	0.328	0.010	0.308	0.348
Total effect	0.435	0.009	0.417	0.453

4.4. Testing the Moderating Effect of Risk Sources: Supporting H3

To test the moderating role of risk sources, this study constructed an interaction term between family and school support and risk sources. The results are shown in Table 6:

Table 6. Analysis of the moderating effect of risk sources

Variable	β	SE	t	p
Home-school support	0.395	0.010	39.50	<0.001
Family risk	-0.086	0.011	-7.82	<0.001
School risk	-0.102	0.012	-8.50	<0.001
Home-school support × School risk	**0.048**	**0.012**	**4.00**	**<0.001**
Home-school support × Family risk	0.019	0.011	1.73	0.084
R^2	0.295		ΔR^2 (interaction term) = 0.004, p = 0.002	

Findings:

(1) The moderating effect of school risk is significant: the coefficient of the home-school support × school risk interaction term is 0.048 (p < 0.001), indicating that the higher the level of school risk, the stronger the promotional effect of home-school support on prosocial behaviour.

(2) The moderating effect of family risk is not significant: the coefficient of the home-school support × family risk interaction term is 0.019 (p = 0.084), which does not reach statistical significance.

(3) Simple slope analysis: As shown in Figure 2, under conditions of high school risk (+1 SD), the effect of home-school support is stronger (simple slope = 0.443, p < 0.001); under conditions of low school risk (-1 SD), the effect is relatively weaker (simple slope = 0.347, p < 0.001).

To illustrate the moderating effect more clearly, Figure 3 plots the differences in the effects of home-school support under different risk source conditions:

When school risk is the primary source of risk, the marginal effect of home-school support is significantly enhanced

When family risk is the primary source of risk, the effect of home-school support remains relatively stable

4.5. Conditional Process Analysis

Further conditional process analysis revealed how sources of risk influence mediating pathways. The sample was divided into two groups based on the predominant source of risk:

Group 1: School-risk-dominant group (school risk > family risk)

Positive psychological mediation effect: 0.126 (95% CI [0.112, 0.141])

Negative cognitive mediation effect: -0.003 (95% CI [-0.007, -0.001])

Group 2: Family-risk-dominant group (family risk ≥ school risk)

Positive psychological mediating effect: 0.098 (95% CI [0.086, 0.110])

Negative cognitive mediation effect: -0.007 (95% CI [-0.011, -0.003])

Tests for differences revealed that the mediating effect of positive psychology was significantly stronger in the school risk group than in the family risk group ($\chi^2 = 4.25$, $p = 0.039$), whereas there was no significant difference in the mediating effect of negative cognition between the groups.

5. Discussion

5.1. The Integrated Effects and Synergistic Value of Home-School Support

This study found that home-school support has a significant positive impact on prosocial behaviour, a finding that supports the integrative perspective of ecosystem theory. Unlike traditional research that analyses home and school factors in isolation, this study constructed a comprehensive support index through principal component analysis, revealing the synergistic effects of family and school support.In practice, this implies that 'home-school co-education' should not remain merely a conceptual framework, but should instead establish a genuine community of support through institutionalised communication mechanisms, consistent educational requirements, and complementary support resources.

5.2. Theoretical Implications of the Dual Mediation Mechanism

The mediating role of positive psychology validates positive psychological capital theory, suggesting that fostering adolescents' self-efficacy, hope, optimism and resilience is a key pathway to promoting prosocial behaviour. More importantly, the masking effect of negative cognition reveals the complexity of prosocial behaviour formation.This finding resonates with the 'altruism arising from suffering hypothesis'-that the prosocial behaviour of some adolescents may stem from a heightened sensitivity to others' suffering, yet such behaviour, accompanied by self-sacrifice, falls within the realm of 'pathological altruism'. This serves as a warning to educators: one must not simply judge the health of development based on behavioural outcomes, but must instead focus on the psychological motivations underlying such behaviour.

5.3. The Moderating Mechanism of Risk Sources

The core finding-that school-related risks can amplify the impact of home-school support on prosocial behavior-can be explained at three levels:

Matching Hypothesis: School support measures (such as improving teacher-student relationships and optimising peer interactions) are highly aligned with school-related risk issues (such as peer exclusion and teacher-student conflicts), enabling direct, targeted effects. Family risks stem from the non-school environment, and school-based interventions constitute 'indirect interventions' with relatively lower alignment.

Accessibility Hypothesis: School-related risks are more visible, making it easier for teachers to identify them and provide timely support; family-related risks are often hidden, requiring more specialised assessment and longer-term intervention. This makes home-school support interventions more timely and effective for students facing school-related risks.

Hypothesis of Differences in Psychological Mechanisms: Analysis of conditional processes reveals that, among students with predominantly school-related risks, home-school support primarily exerts its influence through positive psychological pathways; whereas among students with predominantly family-related risks, the mediating effect of positive psychology is relatively weaker. This may be because family risks more profoundly undermine the accumulation of positive psychological resources, making it difficult for support to be fully channelled through this pathway.

5.4. Implications for the Prevention and Control of School Bullying

(1) Risk Identification and Differentiated Support: Schools should establish student risk screening mechanisms to identify primary sources of risk and implement differentiated strategies.

(2) Optimising the allocation of support resources: For students facing predominantly school-related risks, strengthen the development of internal support systems; for students facing predominantly family-related risks, establish a coordinated 'home-school-community' network.

(3) Strengthening Teachers' Professional Capabilities: Train teachers to identify sources of risk and implement differentiated support.

(4) Focus on psychological well-being: Whilst encouraging pro-social behaviour, remain vigilant against 'pathological altruism' and strengthen mental health education.

6. Conclusion

Through a stepwise analytical framework, this study systematically reveals the mechanisms by which home-school support influences adolescents' prosocial behaviour. The main conclusions are as follows:

(1) Integrated home-school support has a significant promotional effect on prosocial behaviour, and the synergistic effect of family and school support should not be overlooked.

(2) Positive psychology and negative cognition exert dual mediating effects; the masking effect of negative cognition suggests a need to focus on the psychological and motivational health underlying prosocial behaviour.

(3) Risk sources play a moderating role; school-related risks can amplify the promotional effect of home-school

support on prosocial behaviour, whereas the moderating effect of family-related risks is not significant.

The findings offer important implications for educational practice: school support strategies should fully account for the characteristics of students' risk factors and implement targeted interventions. By establishing a differentiated support system, focusing on the health of psychological mechanisms, and strengthening collaboration between home, school and the community, we can more effectively promote the positive development of adolescents and lay a solid foundation for the prevention and control of school bullying.

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