

RESEARCH ARTICLE

Social support and aggressive behavior among Chinese adolescents: The roles of control beliefs and self-control

Xiangnan Li¹, Yongqiang Su^{2,3*}, and Yan Gan⁴¹Department of Student Affairs, Center for Mental Health Education, Shaoxing University, Shaoxing, Zhejiang, China²Department of Psychology, Center for Brain, Mind and Education, Shaoxing University, Shaoxing, Zhejiang, China³Department of Psychology, School of Education and Psychology, Shaoxing University, Shaoxing, Zhejiang, China⁴Department of Psychology, College of Psychology, Sichuan Normal University, Sichuan, Chengdu, China

Abstract

***Corresponding author:**
Yongqiang Su
(suyongqiang@usx.edu.cn)

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Background: Social support has been widely recognized as a psychosocial resource associated with reduced aggressive behavior in adolescence; however, the psychological processes underlying this association remain unclear.

Objective: Guided by the general aggression model, this study examines whether control beliefs and self-control are associated with and may mediate the relationship between perceived social support and aggressive behavior among Chinese adolescents.

Methods: A cross-sectional survey was conducted with 491 secondary school students in China. Participants completed validated self-report measures of perceived social support, control beliefs, self-control, and aggressive behavior. Pearson correlations and serial mediation analyses were performed, controlling for age and gender. Perceived social support was associated negatively with aggressive behavior.

Results: Self-control was found to be a significant mediator of this association. In addition, a sequential association was observed: greater social support was linked to stronger control beliefs, which in turn were associated with greater self-control and less aggressive behavior. The indirect effect of control beliefs alone was not statistically significant.

Conclusion: The findings suggest that social support is associated with lower levels of aggressive behavior, partly through control beliefs processes and a self-control pathway. By clarifying how a modifiable psychosocial resource is linked to adolescent behavioral health through interconnected internal processes, this study provides evidence relevant to promoting adolescent behavioral health and early prevention.

Keywords: Adolescents; Aggressive behavior; Control beliefs; Self-control; Social support

1. Introduction

Adolescence is a critical stage for individuals' mental health and the development of social adaptation skills. Adolescents are particularly susceptible to maladaptive emotional and behavioral responses. Among these, aggressive behavior is not only one of the most important indicators of behavioral and mental health issues, but it also affects others and can cause impaired peer relationships, teacher–student conflicts, poor adjustment at school, and broader public health concerns.¹

Aggressive behavior among adolescents often reflects challenges in self-regulation and adaptation to stressors, but its development, manifestation, and potential consequences are shaped by broader sociocultural contexts.² In China, for example, collectivist cultural values emphasize interpersonal harmony, behavioral restraint, and sensitivity to social relationships; Rapid social change may present adolescents with additional developmental pressures and adaptation challenges.³ Therefore, examining the protective factors and underlying mechanisms associated with aggressive behavior among Chinese adolescents may provide insights not only for promoting behavioral and mental health but also for enhancing the cross-cultural understanding of adolescent behavioral adjustment.

The protective effect of social support on adolescents' self-regulation skills has been well documented. Previous research indicates that higher levels of social support are associated with more favorable psychological and behavioral outcomes, including fewer depressive symptoms, lower levels of anxiety, and fewer externalizing problems such as aggressive behavior.^{1,4} However, the specific psychological processes through which social support is related to reduced aggression remain unclear. In particular, it is unclear whether social support may be linked to adolescents' sense of control over their environment and outcomes, which could be associated with greater self-control and lower aggression.¹ Guided by this rationale, the present study aims to examine the associations between social support and adolescent aggressive behavior from the perspective of health psychology and the general aggression model,⁵ as well as to explore the potential mediating roles of control beliefs and self-control in these relationships, providing a theoretically informed framework for understanding how psychosocial resources may be related to adolescent behavioral adjustment.

Research has consistently shown that social support is an important protective factor for adolescents' behavioral health, including aggressive behavior. During adolescence, support from parents, teachers, and peers is not only

associated with lower levels of physical, relational, and general aggression but may also buffer the potential impact of risk factors such as discrimination, domestic violence, or school-related stress on maladaptive behavioral responses such as aggression.⁶ For example, a longitudinal study reported that support from parents, friends, and teachers was associated negatively with subsequent relational and physical aggression and that higher levels of social support appeared to attenuate the predictive effect of peer racism on relational aggression.⁷ Similarly, social support is not only significantly negatively correlated with aggressive behavior but also may partially mediate the relationship between domestic violence exposure and adolescent aggression.⁶ These findings suggest that social support functions not only as a general positive environmental resource but also as a key psychosocial protective factor consistently associated with healthier behavioral adjustment and lower aggression among adolescents.

However, the protective effects of social support are inconsistent, and the associated mechanisms underlying these associations remain unclear. For example, some studies have reported that the buffering effects of social support are more evident for relational aggression than they are for physical aggression.⁷ Moreover, most of the research has focused primarily on whether social support is related to aggressive behavior, whereas the psychological processes underlying this relationship remain largely unexplored. From a health psychology perspective, this represents an important research gap, as social support may contribute to healthier behavioral outcomes not only through direct protective associations but also through internal cognitive and self-regulatory processes. According to the stress-buffering hypothesis, social support may influence individuals' cognitive appraisal of stress and enhance their perceived coping resources.⁸ Similarly, the general aggression model suggests that environmental factors are often associated with aggressive responses through cognitive, emotional, and self-control processes.⁵ Accordingly, social support may be linked indirectly to reduced aggressive behavior by strengthening adolescents' perceptions of control and predictability, which may support self-control processes and reduce maladaptive aggressive responses.

Control beliefs generally refer to individuals' subjective perceptions of their ability to influence environmental outcomes.⁹ As important cognitive resources, they are associated with adolescents' behavioral health and psychosocial adjustment and may be particularly relevant to aggressive behavior. Higher levels of control beliefs may be associated with more positive adjustment and behavioral outcomes, whereas a lower sense of control is associated with

increased problem behaviors and aggressive tendencies.¹⁰ From a resource perspective, control beliefs can provide a psychological framework that helps individuals cope with stress and support behavioral regulation.¹¹ Conversely, adolescents who perceive themselves as having limited control over external situations may be more susceptible to feelings of helplessness and negative attributions, which are associated with impulsive or externalizing behaviors as coping strategies.⁹ Furthermore, among adolescents, low perceived control is linked to higher levels of maladaptive externalizing behavior, including aggression.⁶ Taken together, these findings suggest that control beliefs may serve as a cognitive resource that underlies, rather than causes directly, downstream control processes. Accordingly, control beliefs may mediate the association between social support and adolescent behavioral adjustment, including aggressive behavior.

From the perspective of social cognitive self-regulation, control beliefs may be conceptualized as distal cognitive resources that are indirectly associated with aggressive behavior, primarily through more proximal self-regulatory processes, such as the activation and maintenance of self-control.¹² Research across diverse cultural contexts indicates that belief-related variables are often linked to behavioral outcomes via self-control mechanisms rather than through direct effects. Despite these insights, the relationship between social support and adolescents' aggressive behavior through control beliefs remains unclear, highlighting a gap in understanding the psychological processes linking external resources to behavioral adjustment.

On the one hand, as an important external resource, social support may be associated with adolescents' perceptions of control and self-efficacy, potentially influencing how adolescents appraise the predictability and controllability of their environment.^{11,13} For example, support from parents, teachers, or peers may help adolescents reinterpret stressful events by providing information, feedback, and emotional reassurance, and such reinterpretation is linked to stronger beliefs in personal control.¹³ This enhanced perception of control may facilitate the engagement of self-control, a regulatory process that is more proximal and that is closely associated with behavioral regulation. In contrast to control beliefs, self-control is widely regarded as a core self-regulatory capacity for managing aggressive behavior among adolescents. Self-control refers to an individual's ability to regulate impulses, delay immediate gratification, and align behavior with social norms and long-term goals.¹⁴ From a health psychology perspective, lower self-control reflects challenges in behavioral regulation that may be associated

with a higher risk for maladaptive outcomes. Evidence across diverse cultural contexts indicates that self-control is correlated negatively with adolescent aggressive and other externalizing behaviors.¹⁵ Taken together, these findings suggest that self-control may function both as a single mediator and as part of a sequential pathway alongside control beliefs, providing a framework for understanding how distal cognitive resources may relate to adolescent behavioral outcomes.

Furthermore, self-control may mediate the association between social support and aggressive behavior. From the perspectives of stress-buffering and resource models, social support is associated with adolescents' access to emotional reassurance, behavioral guidance, and coping resources, which may help reduce the strain that stressful situations place on self-control processes.^{8,11} Adolescents receiving higher levels of social support may be less likely to experience persistent negative emotions or interpersonal tensions and may be better able to maintain stable behavioral regulation.¹⁰ Research has revealed negative associations between social support and aggressive behavior, with evidence that self-control may mediate the relationship between exposure to domestic violence and aggression. These findings suggest that social support may be related to aggression through multiple pathways, including direct associations, indirect associations via control beliefs, and sequential associations involving control beliefs and self-control, although some pathways may not always reach statistical significance. Social support may be linked to self-control through its association with control beliefs, highlighting a potential chain of interconnected psychological processes through which external resources are related to adolescent behavioral adjustment.

Although research has documented associations between social support and aggressive behavior among adolescents, the psychological processes underlying these relationships remain incompletely understood, particularly regarding the combined roles of cognitive factors. Moreover, the cultural context may shape how psychosocial resources and internal regulatory mechanisms operate during adolescent development. Cross-cultural studies suggest that the interaction between interpersonal relationships or attachment processes and self-regulation abilities may differ across countries.¹⁶ For example, pathways involving self-regulation appear particularly pronounced in China, Italy, Spain, and Poland.¹⁶ The systematic developmental research further indicates that although some parent-child processes related to behavioral control and aggression are observed across cultures, the strength and patterns of these associations vary depending on cultural context.¹⁷ Additionally, systematic reviews highlight that

the prevalence and expression of adolescent aggressive behavior differ across cultural settings, with collectivist societies showing distinctive patterns of relational and physical aggression compared to individualist societies.¹⁸ These findings underscore the importance of considering cultural differences when examining how social support, control beliefs, and self-control may be jointly related to adolescents' aggressive behavior. In collectivist cultures that emphasize interpersonal harmony, relational interdependence, and behavioral restraint, adolescents' development and exercise of control beliefs and self-control abilities may be shaped in ways that influence how distal cognitive resources, such as control beliefs, are associated with more proximal self-regulatory behaviors that are related to aggression.¹⁹

The present study adopts the general aggression model as a theoretical framework to examine the associations between social support and adolescent aggressive behavior, as well as the potential mediating roles of control beliefs and self-control. Specifically, the study investigates whether social support is associated with lower levels of aggression both directly and indirectly through associations with adolescents' control beliefs and, in turn, self-control (Figure 1). This study contributes to theory by integrating control beliefs and self-control within a single model, providing a framework for understanding potential sequential associations from cognition to self-regulation. By examining these relationships among Chinese adolescents, this study explores potential indirect pathways

involving self-control and highlights how cultural context may influence the manifestation of these psychological processes, offering insights into how social support may relate to adolescent aggression. These contributions provide a theoretically informed basis for understanding the role of control beliefs and for developing culturally sensitive approaches to promoting adolescent behavioral health.

2. Materials and methods

2.1. Participants

This study used a cross-sectional survey design and recruited 505 participants through whole-class sampling from three public secondary schools in southwestern China. After responses with substantial missing data or invalid patterns were excluded, the final sample included 491 valid responses (97.23% response rate). The final sample had a mean age of 14.49 years (standard deviation = 1.71), and it included 242 female students (49.3%) and 249 male students (50.7%). This study was reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology guidelines.

2.2. Measures

This study employed a self-report questionnaire, with all included scales administered in Chinese using validated Chinese versions. All selected questionnaires and scales are publicly available instruments utilized with proper academic citations and permissions for research purposes.

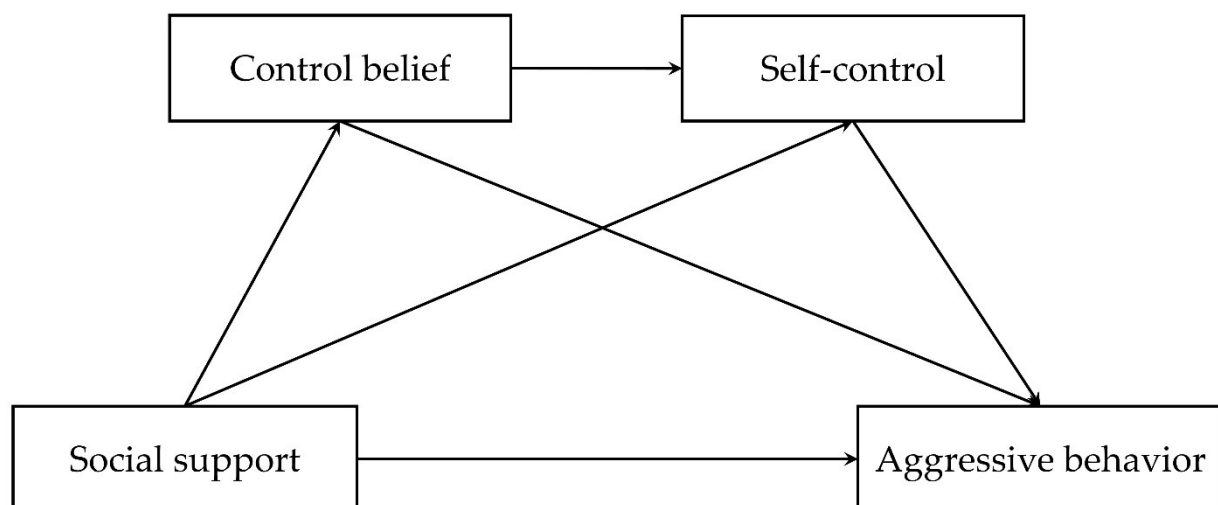


Figure 1. The proposed hypothesis model of this study

2.2.1. Social support

Social support was measured using the Social Support Appraisal Scale.²⁰ This scale has been adapted and applied to Chinese adolescents and has demonstrated good reliability and validity.²⁰ The instrument includes 23 items, divided into three dimensions: family support, friend support, and other support. Students indicated whether they perceived support from their family, friends, and other social connections on a 4-point Likert scale (1 = “strongly disagree,” 4 = “strongly agree”). A higher total score indicates greater perceived social support. In this study, Cronbach’s α of the Social Support Appraisal Scale was 0.89.

2.2.2. Control beliefs

Control beliefs were assessed using the Primary and Secondary Control Scale, which has been adapted for studying Chinese adolescents.²¹ The scale consists of 30 items covering the main dimensions of primary and secondary control, including direct, indirect, cognitive, and emotional. Students responded to each item on a five-point Likert scale (1 = “strongly disagree” to 5 = “strongly agree”). Higher scores indicate a stronger sense of perceived control. In this study, Cronbach’s α of the Primary and Secondary Control Scale was 0.85.

2.2.3. Self-control

Self-control was measured using the Brief Self-Control Scale, which has been validated in a sample of Chinese adolescents.²² Students reported the extent to which a series of 13 items describing impulse inhibition and behavioral regulation apply to them on a five-point Likert scale (1 = “strongly disagree,” 5 = “strongly agree”). Notably, a higher score indicates lower self-control and greater difficulty with impulse inhibition and behavioral regulation. In this study, Cronbach’s α of the Brief Self-Control Scale was 0.77.

2.2.4. Aggressive behavior

Aggressive behavior was measured using the Aggression Questionnaire developed by Buss and Perry.²³ This scale has been applied to the Chinese cohort and comprises four dimensions: physical aggression, verbal aggression, anger, and hostility. It uses a 5-point rating scale (1 = “strongly disagree,” 5 = “strongly agree”). A higher total score indicates a higher level of aggressive behavior. In this study, Cronbach’s α of the aggression questionnaire was 0.85.

2.3. Ethical considerations

This study was approved by the Ethics Committee of Sichuan Normal University (Approval No.: 2025LS0057) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from the

participants and their parents or legal guardians before the data collection. Participation was entirely voluntary. Data collection was conducted in classroom settings by trained research assistants rather than classroom teachers. To ensure confidentiality and reduce potential social desirability bias, the questionnaires were completed anonymously, without the collection of personally identifiable information, and students were instructed to complete them independently. The participants were informed that their responses would be kept confidential, used for research purposes only, and would not be shared with teachers, parents, or school administrators. All data were securely managed by the research team after collection.

2.4. Statistical analysis

Statistical Package for Social Sciences (SPSS 24.0, IBM, United States) was used for data organization and statistical analysis. We took measures to address common method variance both during survey administration and in our statistical analysis.²⁴ During survey administration, the questionnaires were distributed anonymously and confidentially. Items assessing different constructs were distributed across separate pages. The order of the items within each page was randomized, and some items were reverse-coded. Then, before analyzing the data, we conducted Harman’s single-factor test. A total of 27 factors had eigenvalues greater than 1, and the cumulative variance explained by the first factor was 12.24%, which was well below the 40% threshold. We then compared the original confirmatory factor model with a model that included a common latent factor (Δ comparative fit index = 0.02, Δ Tucker–Lewis index = 0.02, Δ root mean square error of approximation = 0.003). Neither analysis revealed substantial common-method bias.

The analysis consisted of three steps. First, descriptive statistics were reported for each study variable. Second, Pearson’s correlation analysis was conducted to examine the associations between social support, control beliefs, self-control, and aggressive behavior. Third, Model 6 in the PROCESS macro (version 3.3) was used to test the indirect associations between social support and aggressive behavior through control beliefs and through self-control. Age and gender were included as control variables in the model. The indirect associations were estimated using 5,000 bootstrap resamples, and significance was determined using 95% confidence intervals (CIs).

3. Results

3.1. Descriptive statistics

Table 1 presents the descriptive statistics for the study variables and their correlations, excluding age and gender,

which were treated as control variables. Stronger perceived social support was associated with a significantly higher level of control beliefs ($r = 0.41, p < 0.001$). In turn, stronger perceived social support and higher control beliefs were both associated with a significantly lower level of aggressive behavior ($r = -0.18, p < 0.001$; $r = -0.11, p < 0.05$). Stronger self-control, as indicated by a lower self-control score, was significantly associated with stronger perceived social support ($r = -0.23, p < 0.001$), higher levels of control beliefs ($r = -0.28, p < 0.001$), and less aggressive behavior ($r = 0.46, p < 0.001$).

3.2. Mediation analysis

For mediation analysis, we employed Model 6 from the PROCESS macro to examine the indirect effects of social support on aggressive behavior via control beliefs and self-control (Figure 1). As shown in Table 2, stronger social support was significantly associated with stronger control beliefs ($B = 0.69, p < 0.001$), better self-control (lower self-control scores; $B = -0.13, p = 0.003$), and less aggressive behavior ($B = -0.18, p < 0.05$). Stronger control beliefs were associated with significantly better self-control ($B = -0.12, p < 0.001$), but not with aggressive behavior ($B = 0.07, p > 0.05$). Finally, better self-control was associated with a significantly lower level of aggressive behavior ($B = 0.90, p < 0.001$).

The direction and strength of the associations are shown in Table 3. In total, a one-point increase in social support scores is indirectly associated with a 0.14-point decrease in aggressive behavior scores, statistically significant with a standard error of 0.05 and a 95% CI of $[-0.248, -0.048]$. Within this, the indirect association between stronger social support and less aggressive behavior via better self-control accounts for a 0.11-point decrease in aggressive behavior (standard error [SE] = 0.04, 95% CI: -0.200 – -0.033). On the other hand, because control beliefs were

not significantly associated with aggressive behavior, social support was not indirectly associated with aggressive behavior through control beliefs (SE = 0.03, 95% CI: -0.019 – 0.109). However, there was a significant indirect association between stronger social support and less aggressive behavior via better self-control, which, in turn, was associated with stronger control beliefs. This serial indirect association accounts for a 0.07-point decrease in aggressive behavior scores for every one-point increase in social support scores (SE = 0.02, 95% CI: -0.116 – -0.039).

As shown in Table 3, the direct association between social support and aggressive behavior was significant even after accounting for the mediators ($c' = -0.18$). In total, approximately 43.75% of the variance in aggressive behavior associated with social support can be explained by indirect associations. Specifically, the indirect association via self-control accounted for 34.38% of the variance, while the indirect association via control beliefs and self-control accounted for 21.88%.

4. Discussion

This study explores how external psychosocial resources and internal psychological processes together affect adolescent behavior by examining the associations between social support and aggressive behavior among adolescents in China. The results indicate that social support is associated with lower levels of aggression and that these associations could be explained by internal cognitive and self-control processes. Stronger social support was indirectly associated with less aggressive behavior through higher self-control; additionally, social support was associated with stronger control beliefs, which in turn predicted higher self-control and, ultimately, less aggressive behavior. Although the cross-sectional design does not allow for causal inference, our findings are consistent with the notion that distal cognitive resources, such as control beliefs, influence behavior through more proximal self-regulatory processes.

Table 1. Correlations among the measured variables

Variables	Mean	SD	1	2	3	4
1. Social support	69.77	9.20	1			
2. Control beliefs	99.90	15.51	0.41***	1		
3. Self-control	43.35	8.68	-0.23***	-0.28***	1	
4. Aggressive behavior	72.27	16.36	-0.18***	-0.11*	0.46***	1

Notes: $n = 491$; * $p < 0.05$; *** $p < 0.001$

Abbreviation: SD: Standard deviation.

Table 2. Regression models for serial mediation analysis

Outcome variables	Predictive variables	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>R</i>	<i>R</i> ²
Control beliefs	Age	−0.12	0.38	−0.31	0.759	0.41	0.17***
	Gender	1.46	1.30	1.12	0.262		
	Social support	0.69	0.07	9.78***	<0.001		
Self-control	Age	1.42	0.21	6.71***	<0.001	0.43	0.19***
	Gender	−0.31	0.72	−0.43	0.665		
	Social support	−0.13	0.04	−2.94**	0.003		
	Control beliefs	−0.12	0.03	−4.75***	<0.001		
Aggressive behavior	Age	−1.39	0.41	−3.40**	<0.001	0.47	0.22***
	Gender	−1.06	1.33	−0.80	0.427		
	Social support	−0.18	0.08	−2.33*	0.020		
	Control beliefs	0.07	0.05	1.38	0.168		
	Self-control	0.90	0.08	10.82***	<0.001		

Note: *n* = 491; All of the models controlled for age and gender; **p* < 0.05; ***p* < 0.01; ****p* < 0.001

Abbreviations: *B*: Unstandardized coefficient; *SE*: Standard error.

Table 3. Direct and indirect effects of social support on aggressive behavior

Effect type	Effect	BootSE	95% BootLLCI	95% BootULCI	Significant
Direct effect	−0.18	0.08	—	—	Yes (<i>p</i> = 0.020)
Total indirect effect	−0.14	0.05	−0.248	−0.048	Yes
Ind1: <i>X</i> → <i>M1</i> → <i>Y</i>	0.05	0.03	−0.019	0.109	No
Ind2: <i>X</i> → <i>M2</i> → <i>Y</i>	−0.11	0.04	−0.200	−0.033	Yes
Ind3: <i>X</i> → <i>M1</i> → <i>M2</i> → <i>Y</i>	−0.07	0.02	−0.116	−0.039	Yes

Note: *X*: Social support; *M1*: Control beliefs; *M2*: Self-control; *Y*: Aggressive behavior; Indirect effects were estimated using 5,000 bootstrap samples; An effect is considered statistically significant when the 95% confidence interval does not include zero.

Abbreviations: BootLLCI: Bootstrap lower limit confidence interval; BootSE: Bootstrap standard error; BootULCI: Bootstrap upper limit confidence interval.

The adolescents in our cohort from China exhibited moderate levels of aggressive behavior, relatively high perceived support, and varying degrees of self-control. The level of aggressive behavior observed in our sample aligns with previous research among Chinese adolescents, which has suggested that a notable proportion display aggressive tendencies.²⁵ The consistent evidence for prevalent

aggressive behavior warrants attention from education and mental health practitioners, and mental health care for adolescents in China should increase focus on preventative screening for maladaptive aggressive behavior.

Overall, the adolescents reported high levels of social support and generally positive control beliefs, consistent with the continuing role of family, school, and peer

relationships as stable support resources in the Chinese context.²⁶ Nevertheless, individual differences in self-control were substantial, implying that even in supportive environments, adolescents may vary in their capacity to translate external resources into effective behavioral regulation. Such variability underscores the need for interventions that not only increase support but also foster consistent self-control skills.

The correlational analyses suggest that more proximal psychological processes, like self-control, were more strongly associated with aggressive behavior than more distal constructs, such as control beliefs and social support. In particular, self-control showed the strongest correlation with aggression, a finding consistent with the literature and highlighting its role in behavioral inhibition and impulse regulation.²⁶ In contrast, the association between social support and aggressive behavior was weaker, consistent with the theory that social support may act as a broader psychosocial resource whose influence is partially reflected in internal regulatory processes, although experimental research is needed to clarify the causal pathway. In specific high-risk contexts, social support might have a more immediate protective effect;^{4,7} however, in more general adolescent populations, its impact appears more distal, as it operates through cognitive and self-control processes rather than directly on aggressive behavior. These findings provide insight into how different resources may relate differently to behavioral outcomes, underscoring the importance of considering both proximal and distal factors in adolescent aggression research.

Similarly, the correlation between control beliefs and aggressive behavior was relatively weak, suggesting that control beliefs may function more as a higher-order cognitive resource than as a direct behavioral influence. The literature suggests that control beliefs often affect psychological and behavioral outcomes indirectly by shaping emotional regulation strategies or behavioral regulation capacities.²⁷ Within cultural contexts such as East Asian societies, which emphasize relationship orientation and situational adaptation, individual control is expressed frequently through understanding and adjusting to the environment rather than altering external circumstances directly.²⁸ Our results suggest that social support, as an external resource, may hierarchically operate alongside internal resources, with self-control positioned closer to aggressive behavior and control beliefs acting as a more distal cognitive resource, potentially influencing aggression indirectly through self-control processes.

Additionally, the indirect associations indicated that social support was associated with lower levels of aggressive behavior both directly and indirectly through self-control,

although the direct association was modest. Social support may influence adolescent aggression not only through internal psychological processes but also through broader psychosocial mechanisms such as emotional buffering, behavioral norms, and relational constraints. For example, previous studies have shown that parental and teacher support can help reduce aggressive reactions by enhancing rule awareness, reducing hostile attributions, and providing behavioral feedback.⁷ For future experimental studies that examine the effects of improving social support, these results provide a model for predicting and measuring the pathways through which social support influences adolescents' mental health.

In contrast, self-control emerged as an important mediator in the association between social support and aggressive behavior. External resources may be associated with behavioral outcomes by supporting adolescents' ability to regulate their behavior. For example, social support can provide stable emotional reassurance and guidance, which may help adolescents manage stress, reduce impulsive decision-making, and develop more effective self-regulatory skills.^{4,29} Consistent with previous research, self-control is closely linked to impulse inhibition and behavioral choices and is associated with lower levels of aggressive behavior.¹⁴ These patterns suggest that the effects of social support on aggression are likely to operate in part through self-control, although causal conclusions cannot be drawn from cross-sectional data.⁴ Importantly, the translation of social support into observable behavioral changes depends on adolescents' ability to engage these self-regulatory resources, highlighting the role of internal regulation in shaping behavioral outcomes.²⁹ Taken together, these findings provide a theoretically informed perspective on how social support may influence aggression through self-regulatory processes, emphasizing the practical relevance of fostering self-control in interventions aimed at reducing adolescent aggression.

The findings regarding serial mediation suggest that social support may influence aggressive behavior, in part, through control beliefs and, subsequently, through self-control. This observation aligns with research, such as studies with Australian adolescents, in which an internal locus of control was significantly associated with greater self-control, and the direct association between control beliefs and health outcomes diminished after accounting for self-control.¹⁰ These results are consistent with the idea that control beliefs often exert their effects indirectly, influencing behavioral outcomes through processes more proximal to behavioral execution, such as self-control.¹⁰ Among Chinese adolescents, similar patterns have been observed, with self-control effects on problem behaviors

further mediated by cognitive processing and decision-making mechanisms. Although these findings support a stepwise association from psychosocial resources to cognitive appraisal and self-regulatory functioning, they should be interpreted as theoretically informed hypotheses rather than established causal pathways.²⁷ This perspective highlights the potential importance of targeting both cognitive and self-control capacities in interventions to reduce aggressive behavior.

Interestingly, the independent mediating effect of control beliefs was not significant. Consistent with prior research, the influence of distal cognitive beliefs often depends on more proximal regulatory mechanisms rather than on behavior. From a social cognitive self-regulation perspective, control beliefs may function as distal cognitive resources that provide a foundation for engaging in self-control processes, which are more closely related to behavioral outcomes.¹² Similar patterns have been observed in studies of adolescent depression, in which general control beliefs were shown to exert effects primarily through subsequent emotional regulation or coping strategies,²⁷ and in health outcomes, among which self-control largely accounted for the influence of control beliefs.¹⁰ These observations suggest that control beliefs may represent higher-order cognitive resources related to the perceived capacity to influence outcomes, whereas observable behavior depends on the engagement of proximal regulatory mechanisms. In collectivist cultural contexts such as China, adolescents may internalize control beliefs as tendencies toward self-restraint or adaptive compliance rather than translating such tendencies directly into overt aggression.³⁰ As a maladaptive externalizing outcome, aggressive behavior relies heavily on immediate inhibitory control. Therefore, unless distal cognitive resources such as control beliefs are translated into self-control engagement, their effects on aggression are likely to be indirect. These findings highlight the central role of proximal mechanisms such as self-control in shaping adolescent behavior and illustrate how cultural norms may influence the translation of cognitive resources into observable outcomes.

Several researchers have conceptualized control beliefs as broader psychosocial protective factors associated with better health, adaptation, and functional outcomes, although their influence may depend on more sustained cognitive and emotional engagement.¹¹ For example, control beliefs may be related to long-term behavioral outcomes such as depression, stress, coping, and health behaviors, whereas aggressive behavior tends to be more impulsive and immediate and relies heavily on inhibitory capacities at the behavioral execution level.^{9,10} These findings suggest that control beliefs are likely to affect

aggression indirectly, primarily through their influence on self-regulatory processes such as self-control. Cross-cultural research further indicates that individuals in East Asian contexts often cope by adjusting their own behavior and beliefs rather than by changing the environment directly.²⁸ In particular, collectivist norms emphasizing interpersonal harmony and relational interdependence in Chinese culture may strengthen this tendency, so control beliefs primarily guide internal regulation rather than overt behavior.³⁰ This interpretation implies that among Chinese adolescents, control beliefs are more likely to be internalized as tendencies toward self-restraint, contributing indirectly to the regulation of aggressive behavior by supporting self-control rather than directly inhibiting aggression. This perspective provides a nuanced, theoretically informed account of how control beliefs may influence adolescent behavioral health in collectivist cultural settings.

The present findings have both theoretical and practical implications. Theoretically, this study provides support for a hierarchical interplay between control beliefs and self-control in relation to adolescent aggressive behavior. The observed associations are consistent with the idea that social support may influence aggression indirectly through these internal processes, although causal conclusions cannot be drawn from the cross-sectional design. These results suggest that interventions aimed at enhancing social support and self-control may reduce aggression among adolescents. Nevertheless, the observed effect sizes were modest, indicating that these factors alone are unlikely to produce large behavioral changes. Therefore, interventions may be most effective when combined with strategies targeting familial, school, or peer contexts. Additionally, all variables were measured via self-reports, which may influence the observed patterns of association. Considering both the statistical and practical significance of these findings provides a balanced perspective on their relevance for theory development and real-world applications while highlighting areas for future research to strengthen causal inferences and intervention strategies.

5. Limitations

Although this study provides new insights into the associations between social support, control beliefs, self-control, and aggressive behavior among adolescents, several limitations should be acknowledged. First, the cross-sectional design precludes causal inference and limits the ability to establish temporal ordering among variables. Although the proposed serial mediation model is theoretically informed, the observed associations should not be interpreted as evidence of directional or causal pathways. Future research employing longitudinal or experimental designs is needed to test more rigorously the dynamic relationships among these variables.

Second, all variables were assessed using self-report measures, which may be subject to social desirability bias and common method variance, particularly given the sensitivity surrounding aggressive behavior. Although procedural steps were taken to ensure anonymity and confidentiality, and Harman's single-factor test suggested that common method bias was not a serious concern, these approaches cannot fully eliminate potential bias. Nevertheless, residual bias cannot be fully ruled out, and shared method variance may have influenced the magnitude of the observed associations and indirect effects. Therefore, all findings should be interpreted with caution, emphasizing associational rather than causal relationships. Future research should incorporate multi-method assessments and longitudinal or experimental designs to enhance causal inference and intervention evaluation.

Finally, the sample was drawn from secondary school students in a specific region of China, which may limit the generalizability of the findings to other cultural or sociodemographic contexts. Cultural factors, such as collectivist values and norms surrounding behavioral regulation, may shape the observed relationships, and future research should examine the proposed model across diverse cultural settings to enhance its external validity.

6. Conclusion

This study systematically examined associations between social support and aggressive behavior in adolescents, as well as the potential psychological pathways involved. The results indicate that social support is associated with aggressive behavior and appears linked to self-control through a sequential relationship with control beliefs. In this pattern, self-control is a central factor, while control beliefs serve as distal cognitive resources that support self-regulatory capacity. These findings suggest potential interrelationships between external psychosocial resources and internal individual systems in relation to aggressive behavior, offering insights for supporting adolescent mental health.

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Conflict of interest

The authors declare no conflict of interest.

Author contributions

Conceptualization: Xiangnan Li, Yongqiang Su

Investigation: Yan Gan

Methodology: Xiangnan Li, Yongqiang Su

Formal analysis: Yongqiang Su

Writing—original draft: Xiangnan Li, Yongqiang Su

Writing—review & editing: All authors

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Sichuan Normal University (Approval No. 2025LS0057) and was conducted in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants and their parents or legal guardians.

Consent for publication

Consent for publication was obtained from the participants' legal guardians.

Availability of data

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Further disclosure

The authors explicitly confirm that no artificial intelligence tools were used in any capacity during the preparation of this manuscript, including study design, data analysis, interpretation, conclusion drawing, or language polishing.

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