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The impact of cumulative family risk on the social adaptation of left-behind children: the chain mediation of teacher support and sense of self-worth

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Abstract

Background At present, there is still a large group of left behind children in China, whose physical and mental health is greatly affected by multiple risks such as low family economic levels, incomplete family structures, and distant parent-child relationships.

Purpose This study explores the impact of cumulative family risks on the social adaptation of left-behind children, contributing to a better understanding of the complexity and severity of the challenges they face. It provides a scientific evidence for schools and relevant government departments to formulate policies aimed at improving the physical and mental health of left-behind children and enhancing their adaptive capacity.

Methodology We selected 962 primary school students in grades 4 and 5 from a city in Jiangsu Province as participants. The assessment tools included a family cumulative risk questionnaire, a teacher support scale, a self-worth scale, and an adolescent social adaptation scale.

Results Research findings demonstrate a significant correlation between family cumulative risk, teacher support, self-worth, and the social adaptation of left-behind children. Family cumulative risk can negatively predict the social adaptation of left-behind children. Additionally, Teacher support and self-worth partially explain how cumulative family risks affect social adaptation of left-behind children.

Conclusion These studies suggest that cumulative family risk directly affects the social adaptation of left-behind children and indirectly impacts social adaptation through the mediating role of teacher support and self-worth.

Keywords Left-behind children, Family cumulative risk, Teacher support, Sense of self-worth, Social adaptation

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Introduction

"Left-behind children" refers to those under the age of 18 whose parents migrate to cities for work, leaving them behind in their rural hometowns. These children are unable to live with both parents, which poses significant emotional and social challenges [1]. Although this issue is most prominent in China, it is not unique to the country. It is a common challenge faced by many developing nations amidst the process of urbanization and economic globalization. As rural laborers move to cities for employment opportunities, often due to high living costs and demanding work environments, many are forced to leave their children behind, creating a growing population of left-behind children globally [2]. In China, a joint report released by the National Bureau of Statistics and the United Nations Children's Fund in 2023 revealed that, in 2020, there were 66.93 million left-behind children, including 25.16 million in urban areas and 41.77 million in rural areas [3]. Studies have shown that left-behind children generally lag behind non-left-behind children in terms of academic performance, emotional well-being, interpersonal relationships, and life adaptation [4]. Social adaptation, as an important indicator of the interaction between individuals and the environment, not only signifies mental health but also serves as a predictor of future development [5]. Long-term maladjustment in social adaptation can severely harm the physical and mental health of left-behind children and even lead to a series of social issues, such as educational deficits, rising crime rates, and intensified social conflicts. While existing research has focused on the psychological and adaptive challenges faced by left-behind children, few have explored the underlying mechanisms of these challenges from the perspective of cumulative risk. Cumulative risk theory posits that when children are exposed to multiple risk factors, these factors may interact and compound, leading to more severe negative impacts on their development [6]. Therefore, studying cumulative risk provides a more comprehensive and in-depth understanding of the difficulties faced by left-behind children, offering a theoretical basis for designing more effective interventions. Additionally, it provides valuable insights for policymakers and institutions, helping them improve the living and educational conditions of left-behind children.

Family risk factors

Family risk factors are a key aspect of understanding the challenges faced by left-behind children. Different studies define family risk factors in various ways. For instance, Gerard and Buehler categorize family risk into family structure risks (such as divorce), family resource risks (e.g., low socioeconomic status and parental education), and family atmosphere risks (e.g., low conflict or intimacy among family members) [7]. Fergusson and Horwood examined family risk factors from four aspects: insufficient socioeconomic resources, impaired mental health of parents, poor marital function, and low parenting efficiency [8]. Ferg et al. believe that the family risk factors for adolescent problem behaviors mainly include low-income family management; family conflict; parental attitudes toward antisocial behavior; parental attitudes toward alcohol, tobacco, and drug use; and a family history of antisocial behavior [9]. These family risk factors can be divided into two main categories: family physical risks and family psychological risks. Family physical risks encompass factors such as economic status, family health, family structure (e.g., parents' marital status), parents' education levels, and history of criminal or violent behavior. Family psychological risks include factors like the level of family care and support, abuse, and domestic violence [10]. Based on these categorizations of family risk, this study will focus on family physical and psychological risk factors, parent-child relationships, and family support, in order to measure the cumulative family risks faced by left-behind children.

Family risks and the social adjustment of left-behind children

Among the factors affecting individual social adaptation, the family, as the most crucial micro-system, plays a vital role in the physical and mental health of children and adolescents [11]. Family risk factors refer to various elements within the family micro-system that may increase the likelihood of adverse development for the individual [12]. Research has shown that family risk factors such as low-income family economic status, frequent negative life events, strained parent-child relationships, and incomplete family structures can have significant and potentially irreversible impacts on the physical and mental health development of adolescents. These family risk factors can positively predict anxiety, depression, and self-injurious behaviors in adolescents while negatively predicting their life satisfaction [13]. Family risk factors are also linked to problematic behaviors during childhood [14], and exposure to multiple risks increases susceptibility to subsequent negative behaviors [15]. These factors can disrupt children's self-control and self-regulation skills, making them more prone to aggressive, anxiety, and depression [16]. Even though the greater economic stability resulting from parents' departure was expected to bring positive changes, it did not guarantee positive development in family relationships. In fact, more than half of the respondents reported a deterioration in their relationships with family members and experienced significant psychological and emotional deprivation. As a result, the family's social sustainability for the next generation was adversely affected [17].

According to the Family Stress Model (FSM), family difficulties and stress are only indirectly related to children's adaptation, and parents' emotional and behavioral responses to family difficulties being the primary causes of poor adaptation in children [18]. For left-behind children, while their families may face siginificant economic pressures, these pressures can lead to a range of emotional distress for guardians, which can easily trigger family conflicts [19]. This includes increased criticism and blame toward children or even violent behavior, resulting in impaired closeness in parent–child relationships [20]. Consequently, children experience significant psychological stress, which can lead to various internalized (such as depression and anxiety) and externalized (such as aggression and rule-breaking) problematic behaviors [21]. In families with lower socioeconomic status, parents generally have a relatively lower level of education [22]. Owing to the limitations of their educational level, parents may lack effective communication skills and emotional expression abilities, especially when communicating with their children through the screens of mobile phones or computers. This leads them to prefer simple and even harsh educational methods when dealing with their children's education and behavioral issues. As a result, children who already lack parental care feel even more lonely, oppressed, and misunderstood. This emotional alienation can have adverse effects on children's psychological health and social adaptation. Therefore, on the basis of the Family Stress Model, we select family risk factors that have a more significant impact on left-behind children as stressors to explore the potential developmental mechanisms affecting the social adaptation of left-behind children. Based on this, we selected the family risk factors that have a greater impact on left-behind children as stressors to explore their associations with social adaptation and potential pathways of influence. We propose that:

H1 Cumulative family risk can negatively predict the social adaptation of left-behind children.

Even though family risk can cause social adaptation problems for left-behind children, other factors, such as external social support and inner psychological resources, also affect their social adaptation process. The "pressure-resource-adaptation" paradigm holds that the stressors an individual experiences may lead to a series of physiological and psychological negative reactions [23]. An individual's adaptability is influenced by the resources at their disposal, including but not limited to personal resilience, social support networks, economic resources, and cultural capital. Individuals can use these resources to reduce the impact of stress, restore their psychological balance, and promote healthy adaptation through key behaviors. Therefore, this study aims to study two important resources, teacher support (an external resource for left-behind children) and self-esteem (an inner resource), to explore the mediating role of teacher support and self-esteem in the relationship between family risk and left-behind children's social adaptation.

The role of teacher support

According to the ecological systems theory, children's development occurs within and through interactions with their primary environments, such as family and school. Parents and teachers, as two crucial figures, play significant roles in children's growth. Gao Jie conducted a questionnaire survey in three primary and secondary schools in Shanxi Province and found a significant positive correlation between teacher support and school adaptation among left-behind children, including all its dimensions [24]. However, some studies have revealed that left-behind children with higher family risks tend to receive less teacher support [25]. The Conservation of Resources Theory emphasizes that individuals strive to obtain, retain, and protect resources they perceive as valuable [26]. In educational contexts, teachers' time, energy, and attention are limited resources. Left-behind children with high cumulative family risks often face more complex and severe challenges. For instance, extreme family financial difficulties may result in a lack of essential material support for their studies, such as books and stationery; parental mental health issues or dysfunctional marriages may subject them to more emotional neglect or harm. Weakened family functioning reduces the efficiency of home-school communication, limiting teachers' understanding of left-behind children's needs [25]. These issues pose greater educational challenges for teachers, requiring them to invest more time and effort. However, in real educational settings, teachers often face significant work pressure and heavy teaching workloads, and their resources are limited. When faced with left-behind children with high cumulative family risks, teachers might have felt that even providing these children with more attention and assistance would hardly change their situations. As a result, they may have chosen to allocate their limited resources to other students who seemed more likely to achieve positive outcomes. Reduced teacher support places left-behind children with high cumulative family risks in a more disadvantaged position at school. Lacking emotional support from teachers, they may feel neglected and isolated, which can negatively impact their self-esteem and confidence [27]. Academically, without timely guidance and encouragement from teachers, they may fall behind in their studies, further exacerbating their sense of frustration [28]. These negative emotions and learning experiences hinder their normal interactions with peers, making it difficult for

them to integrate into the group and ultimately leading to poorer social adaptation. Therefore, this study hypothesizes the following:

H2 Teacher support plays a mediating role in family cumulative risk and social adaptation of left-behind children.

The role of sense of self-worth

Self-worth is the belief that people gradually form about themselves in interpersonal relationships, and it is the core content of self-esteem. A high sense of self-worth can give individuals a more positive evaluation and cognition of themselves and impact their emotions, behaviors, and social adaptation. Rosenberg's social connection theory points out that low self-esteem weakens the connection between individuals and society. In contrast, individuals with high self-esteem are more likely to establish close connections with society, have a greater degree of compliance with social norms, exhibit fewer problematic behaviors, and have better social adaptation [29]. Research has shown that the greater the quality of parental companionship is, the better the development of children's sense of self-worth [30]. High-quality parent–child relationships help improve children's sense of self-worth, whereas poor parent–child relationships hinder the development of children's sense of self-worth [31]. The left-behind experience causes left-behind children to suffer from long-term emotional neglect and more traumatic experiences, which is likely to lead to their lower self-evaluation, which in turn leads to more adaptability problems. According to ego system theory, an individual's sense of self-worth is affected by cognition, emotion, and behavior within the ego system [32]. Suppose there are negative cognition and emotions in an individual's ego system. This may lead to negative self-evaluations and low self-esteem, which affect the formation and development of a sense of self-worth. An unhealthy sense of self-worth will reduce an individual's self-confidence, make him unable to cope well with challenges and difficulties and maintain a positive attitude and behavior. On this basis, Hypothesis 3 of this study is proposed:

H3 A sense of self-worth plays a mediating role in family cumulative risk and the social adaptation of left-behind children.

Teacher support and sense of self-worth as a mediator

Social support theory holds that teachers are important actors in students' social support networks [33]. Teachers are not only knowledge imparted but also an important part of students' social support network. The support of teachers is not only reflected in educational content but also includes emotional support, cognitive support, and behavioral support. For groups such as left-behind children, teacher support is especially important because they lack family companionship and support, and teachers can fill this gap and provide emotional comfort and encouragement. Perceived support can allow left-behind children to experience a sense of "being loved" and increase their sense of self-acceptance [34]. Especially in early childhood, studies have shown that the predictive power of the teacher–student relationship even exceeds the predictive power of parenting style for children's problem behavior [35]. Xue and Jiang also confirmed that perceived teacher support is an external protective factor for children's low self-esteem, which can alleviate the negative impact of low self-evaluation and a low sense of self-worth [36]. Therefore, based on the above theories and studies and combining Hypothesis 2 and Hypothesis 3, Hypothesis 4 is presented here:

H4 Teacher support and sense of self-worth play a chain mediating role in the influence of cumulative risk in left-behind children's families on their social adaptation.

Research methodology

Sampling and collection of data

Three schools with many left-behind children were selected from Huai an city, Jiangsu Province, and 4~7 classes were selected from each school's fourth and fifth grades for testing. A total of 17 classes were selected from the fourth and fifth grades, with approximately 40 students in each class. Before the test, we communicated with the school manager and obtained survey permission from the school and parents. The test was conducted by an undergraduate majoring in psychology who had systematically learned psychological test techniques and statistical measurement knowledge, and the student's class teacher cooperated with the test. Before the test, primary school students in one class were selected for a pretest. The parents of the students were asked to sign an informed consent form before the test. The facilitator read the instructions during the test, after which the students completed the questionnaires. It took approximately half an hour to complete the questionnaire, which was collected immediately after the test. This study was approved by the Ethics Committee of Huaiyin Normal University.

Respondents information

Questionnaires with serious data missing (more than one-quarter of the items were not selected) and obvious response biases (such as selecting the same number for all items or making regular selections in a zig-zag pattern) were removed. Finally, 962 valid subjects were obtained, and the effective rate of the questionnaire

was 95.4%. Among them, 476 were boys, accounting for 48.2%, and 479 were girls, accounting for 49.8%. Seven students did not provide gender information; 447 students in Grade 4, accounting for 46.5%, and 515 students in Grade 5, accounting for 53.5%; 484 left-behind primary school students, accounting for 50.3%; and 468 non-left-behind primary school students, accounting for 48.7%. The average age of the subjects was 10.8 ± 0.731 years.

Measurements

Family Physical Risk Questionnaire, The personal family physical risk questionnaire compiled by Xu, Ye, and Fang (2020) was adopted [37]. After slightly adapting the questionnaire items (three overlapping items with other questionnaire items were deleted), the adjusted questionnaire had a total of 12 items, and the Cronbach's α coefficient of this questionnaire in this study was 0.60. Subjects whose scores were greater than or equal to the 75th percentile were considered at risk and coded as 1; the remaining subjects were not at risk and were coded as 0 [38].

Family Psychological Risk Questionnaire, We measured Family Psychological Risk via the Family Adverse Psychological Experience Questionnaire revised by Loucks et al. [39]. Subjects answered questions about how their parents or other adults in the family treated them during childhood, including physical and psychological aspects. Seven items are in total, some of which are reverse scored. The Cronbach's α coefficient of this questionnaire in this study was 0.70. The higher the score was, the more negative the experiences the adolescents had. A score above 75% is considered risky and is coded as 1; the rest are risk-free and are coded as 0.

Parent–child relationship questionnaire, We measured parent–child relationships via the simplified version of the parent–peer attachment questionnaire revised by Raja, McGee, and Stanton [40]. The scale consists of 10 items and is rated on a 5-point scale. The Cronbach's α coefficient of this questionnaire in this study was 0.78. Subjects whose scores were less than or equal to the 25th percentile were considered at risk and coded as 1; the remaining subjects were not at risk and were coded as 0.

The family support questionnaire, The family support dimension of the Insight Social Support Questionnaire was adopted [41]. The scale consists of 4 items and is scored from 1 to 7. The Cronbach's α coefficient of this questionnaire in this study was 0.84. The higher the total score is, the better the family support status. Those who scored 25% or less on the questionnaire were assigned a 1, whereas those who were not at risk were assigned a 0.

Social Adaptation Scale, The social adaptation scale for children and adolescents compiled by Miu et al. [42]. has 34 questions, including four dimensions: interpersonal harmony, environmental identity, life independence, and learning autonomy. A five-point Likert scale is adopted. The higher the total score is, the better the social adaptation is. The Cronbach's α coefficient of this questionnaire in this study was 0.96.

Teacher Support Questionnaire, A questionnaire on students' perceived teacher support behavior was adopted for teacher support [43]. The questionnaire is divided into two dimensions, emotional support and instrumental support, with a total of 9 questions and a five-level score. The higher the score is, the greater the degree of teacher support students perceive. In this study, the Cronbach's α coefficient of the scale was 0.92, among which the Cronbach's α coefficient of instrumental support was 0.84 and the Cronbach's α coefficient of emotional support was 0.89.

Sense of Self-Worth Questionnaire, Self-worth was measured via the subscale of overall self-worth in the Scale of Self-Worth for Adolescents compiled by Huang and Yang [44]. There were six items on the scale, and the score was five levels, with 1 to 5 representing "completely inconsistent" to "completely consistent", respectively. The higher the total score is, the stronger the sense of self-worth. In this study, the Cronbach's α coefficient of this scale was 0.71.

Data analysis

The data were statistically processed using the SPSS 25.0 statistical software package. First, descriptive statistical analysis was conducted on the basic demographic characteristics of the sample and the main research variables. Second, bivariate Pearson's correlation analysis was employed to explore the pairwise relationships among the main variables. Finally, Model 6 in the PROCESS macro (Version 3.5) developed by Hayes was used for mediating effect analysis, and the Bootstrap method (with 5,000 repeated samplings) was adopted to calculate the confidence interval (95% CI) of the mediating effect. If the confidence interval does not include 0, it indicates that the mediating effect is significant.

Results

Common method deviation test

This study adopted anonymous filling and reverse scoring of some items to control for the bias effect of standard methods when collecting data. In addition, principal component analysis was performed via the Harman single-factor test. The results are as follows: there are 15 factors with eigenvalues greater than 1, among which the explanatory variance of the first factor is 19.63%, which is less than the critical value of 40%, indicating that this study is not significantly affected by common method bias.

Table 1 Descriptive statistics for family risk indicators ($n = 471$)

Risk categories	M (SD)	Items	Grading	Risk definition Criteria	Risk prevalence
1 Family physical risk	0.43(0.22)	12	0–2	Above or equal to the 75th percentile	26.5%
2 Family psychological risk	0.65(0.64)	7	0–3	Above or equal to the 75th percentile	28.5%
3 Parent-child relationship	3.64(0.58)	10	1–5	Less than 32	25.9%
4 Family Support	5.87(1.42)	4	1–7	Less than 41	26.8%

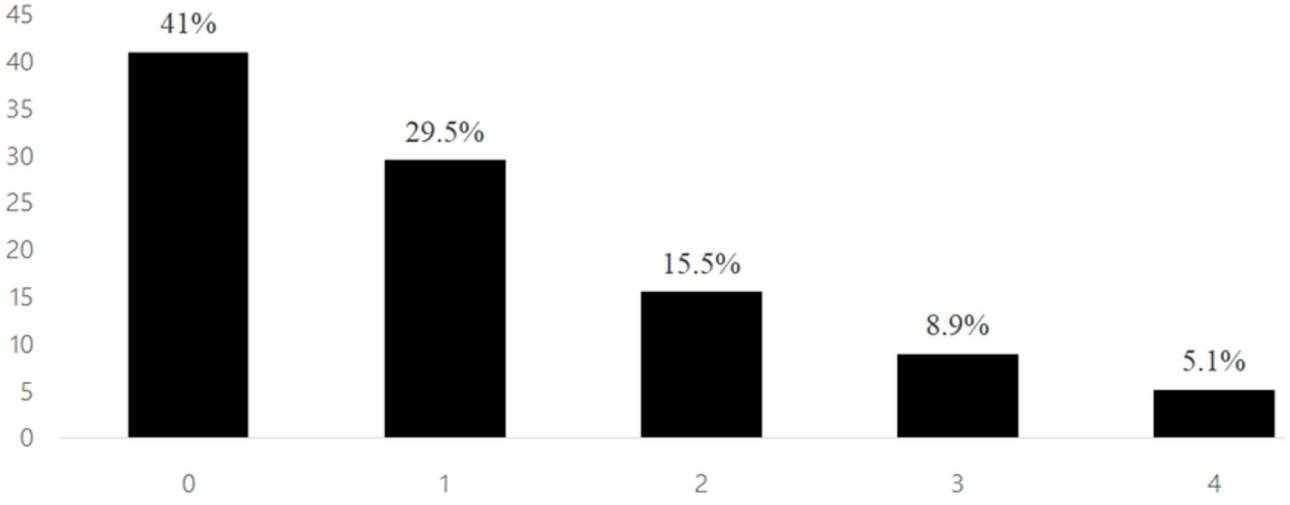

Fig. 1 Cumulative family risk prevalence of left-behind children

Table 2 Means, standard deviations and correlation coefficients between variables

	M	SD	Scoring range	1	2	3	4	5
1 Grade	1.53	0.50						
2 Class cadre	1.62	0.52		0.24				
3 Family cumulative risk	1.23	1.27		0.05	0.08			
4 Teacher Support	4.19	0.84	1–7	0.24**	0.16**	-0.29**		
5 Sense of self-worth	3.93	0.83	1–5	0.13**	0.06	-0.46**	0.26**	
6 Social Adaptation	4.34	0.81	1–5	0.03	0.17**	-0.37**	0.31**	0.34**

Note: *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$, the same below

Basic information about the cumulative risk of families with left-behind children

According to the coding standard of risk factors, the proportion of left-behind children exposed to various kinds of family risk and the percentage of exposure to 1 ~ 4 kinds of family risk were further analyzed. As shown in Table 1, the proportions of family psychological risk and family support risk among left-behind children are relatively high, at 28.5% and 26.8%, respectively. Further investigation of the family cumulative risk index of left-behind children reveals that 45% of left-behind children are exposed to 1 or 2 risks at the same time (29.5% + 15.5%), and 14% of left-behind children are exposed to more than three risks at the same time (8.9% + 5.1%), which proves that the family cumulative risk index of left-behind children is high(Fig. 1).

Descriptive statistics and correlation analysis

The results of descriptive statistics and correlation analysis are shown in Table 2. Cumulative family risk (the family cumulative risk score is the sum of the four risk factor indices: family physical risk, family psychological risk, parent–child relationship, and family support) is significantly negatively correlated with social adaptation, teacher support, and left-behind children's sense of self-worth; the social adaptation of left-behind children is significantly positively correlated with teacher support and sense of self-worth; and teacher support is significantly positively correlated with the sense of self-worth. Among them, there is the strongest negative correlation between cumulative family risk and self - worth (r = -0.46).

Serial mediation effects and hypothesis testing

A chain mediation model was established with family cumulative risk as the independent variable, teacher support and sense of self-worth as the mediating variables,

Table 3 Regression analysis of variable relationship

Regression equation		Overall fit index			Regression coefficient significance			
Outcome variables	**Predictor variables**	**R**	**R^2**	**F**	**Beta**	**SE**	**95%CI**	**t**
Teacher support	Grade level	0.39	0.16	27.88**	-0.40	0.08	-0.06 -0.25	-5.17**
	Class leader				-0.24	0.08	-0.55 -0.25.	-3.13**
	Cumulative household risk				-0.24	0.04	-0.32 -0.17	-6.28**
Sense of self-worth	Grade	0.48	0.23	35.17**	-0.00	0.08	-0.33 -0.01	-2.03**
	Class Leader				-0.01	0.08	-0.16 0.15	-0.01
	Cumulative household risk				-0.41	0.04	-0.49 -0.33	-9.82**
	Teacher Support				0.13	0.05	0.03 0.22	2.68**
Social Adaptation	Grade	0.47	0.22	25.99**	0.12	0.09	-0.05 0.28	1.34
	Class leader				-0.22	0.08	-0.37 -0.05	-2.60**
	Household cumulative risk				-0.22	0.05	-0.31 -0.13	-4.67**
	Teacher Support				0.21	0.05	0.11 0.31	4.26**
	sense of self-worth				0.19	0.05	0.10 0.29	4.00**

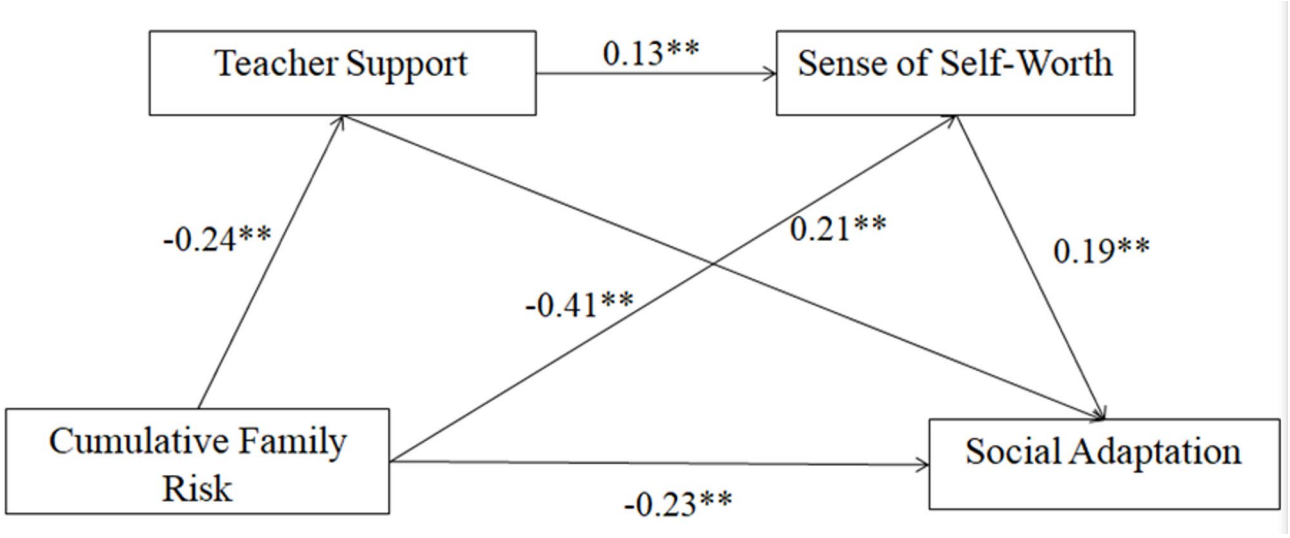

Fig. 2 Chain-mediatedmodel of cumulative family risk, teacher support, sense of self-worth, and social adaptation

Table 4 Analysis of mediated effect size

	Estimate	SE	95%CI	Effect size
Total mediation effect	0.15	0.03	-0.19 -0.09	68.18%
Indirect Effects 1	0.06	0.02	-0.09 -0.02	27.27%
Indirect Effects 2	0.08	0.02	-0.13 -0.04	36.36%
Indirect Effects 3	0.01	0.01	-0.02 -0.01	2.78%

Note: Indirect effect 1: Family cumulative risk → teacher support → social adaptation;

Indirect effect 2: family cumulative risk → sense of self-worth → social adaptation;

Indirect effect 3: family cumulative risk → teacher support → sense of self-worth → social adaptation

and social adaptation as the dependent variable. The path analysis results of the structural equation model (Table 3) revealed that the path coefficients between family risk and teacher support (β=-0.26, $P<0.01$), family risk and sense of self-worth (β=-0.40, $P<0.01$), and teacher support and sense of self-worth (β = 0.15, $P<0.01$) were statistically significant in the mediating effect model. Cumulative family risk negatively predicts teacher support, a sense of self-worth, and the level of social adaptation of left-behind children. Teacher support is significantly positively correlated with self-worth and positively predicts the social adaptation of left-behind children. The mediating effect was tested on the basis of the structural equation model shown in Fig. 2. The results are shown in Table 4. The mediating effect size of teacher support between family cumulative risk and social adaptation is 0.06, and the 95% confidence interval of the mediating effect is [-0.09, -0.03], indicating that the mediating effect of teacher support is significant. The mediating effect size of self-worth between family cumulative risk and social adaptation was 0.07, and the 95% confidence interval of the mediating effect was [-0.12, -0.03]. The chain mediating effect size of teacher support and self-worth on family cumulative risk and left-behind children's social adaptation level was 0.01, and the 95% confidence interval of the mediating effect was

[-0.02, -0.01], indicating that the chain mediating effect of teacher support and self-worth was significant.

Discussion

Relationship between cumulative family risk and the social adaptation of left-behind children

Cumulative family risk is significantly negatively correlated with the social adaptation of left-behind children, which verifies Hypothesis 1. This finding is consistent with the findings of Xu et al. [37]. With the increase in accumulated family risk, the negative emotional experiences of left-behind children, such as a lack of confidence and helplessness, also increase. These negative experiences cause left-behind children to show an inactive attitude in all aspects of social adaptation, which further affects the development of their social adaptation [45]. A meta-analysis by Wang et al. also revealed that, in general, left-behind children have poorer social adaptation, greater loneliness, and lower happiness than non-left-behind children do; additionally, left-behind children are more likely to exhibit antisocial behavior and negative emotions [46]. The reason for this phenomenon, according to Zhang, is related to the subtle influence of family function and family education style on children's psychological development [47]. Left-behind children's family functions may be deficient because their parents have not lived there for a long period of time. Research by Xiang confirms that dysfunctional family functions can seriously affect the emotional health of left-behind children [48]. According to ecosystem theory, the family is also a complex and dynamically evolving system, and the emotional connection and intimacy among family members can provide stable support and a sense of security, promoting the balance and stability of the family system. However, owing to long-term parent–child separation, left-behind children cannot communicate with their parents promptly, and the emotional connection and intimate relationship between parents and children become fragile. If children experience more conflict and instability in the family, they may have more negative or hostile views of themselves and society, which in turn affects their interpersonal relationship adaptation and academic performance [49]. Therefore, the accumulation of family risk tends to cause children to be in a state of stress and insecurity [50], which affects their need for safety and stability and further affects the healthy development of the behaviors and emotions of left-behind children, resulting in many social maladaptation outcomes [51].

The mediating effect of teacher support

This study revealed that teacher support for left-behind children had a mediating effect on family cumulative risk and social adaptation, Left-behind children with higher cumulative family risks tended to receive less teacher support, which in turn led to poorer social adaptation, verifying Hypothesis 2. Li Xiaona's research revealed that teachers' high-level support could promote the development of adolescents' positive psychological qualities, making children more courageous and resolute in the face of difficulties [52]. Adequate teacher support enabled students to feel valued by their teachers, thereby influencing their academic adaptation [50]. However, the results of this study showed that children with higher family risks received less teacher support and exhibited poorer social adaptation. According to the resource dilution theory, higher family risks implied a reduction in resources available within the family to support children's education. High family risks could weaken the positive connection between families and schools. These families might lack sufficient time, energy, and material resources to establish positive collaborative relationships with teachers. Without active feedback and cooperation from high-risk families, teachers might reduce their support for these children, further exacerbating the social maladaptation of left-behind children [25]. Moreover, left-behind children from high-risk families were often cared for by grandparents or relatives. Children under the care of grandparents received significantly less teacher support compared to those under parental care, as grandparents tended to have outdated educational beliefs and weaker willingness to communicate with schools, making it difficult for teachers to intervene in a timely manner and creating a support gap [53]. Insufficient teacher support further diminished the resources available to left-behind children, leading to more severe social maladaptation. Therefore, schools and teachers should pay more attention to and care for left-behind children, as they urgently needed resources beyond their families to ensure their healthy development. Schools could implement teacher training programs that included enhancing awareness of the psychological characteristics of left-behind children, offering professional courses and case studies to help teachers identify common psychological issues, improving teachers' communication and support skills, and fostering multicultural awareness to better understand children from diverse backgrounds. At the same time, strengthening home-school collaboration and maintaining regular communication with parents about children's progress could jointly support the growth of left-behind children.

The mediating effect of the sense of self-worth

This study revealed that left-behind children's sense of self-worth plays an intermediary role between family cumulative risk and social adaptation, verifying Hypothesis 3. Smith et al. reported that children with greater family risk have a lower sense of self-worth and a weaker ability to adapt to society [54]. According to ego theory,

external factors do not independently affect individual behaviors, and the self-cognitive process plays a decisive role [55]. The sense of self-worth is relatively stable among the personality factors accompanying children's future life and development. It has a diffuse effect and influences individuals' cognition, emotion, and behavior later in life [56]. The greater the sense of self-worth is, the more confident the individual will be in the process of interpersonal communication, the greater the ability to take the initiative to communicate with others and have good and healthy interpersonal relationships [57], and the greater their social adaptability. A high sense of self-worth is generally associated with good social relationships [58], and a significant positive correlation exists between self-worth and students' social adaptability. One study revealed that parents' care can enhance children's sense of self-worth [59]. The more harmonious the family environment is, the greater the degree of parent–child communication, and the more participation and support parents give their children, the better the children's sense of self-worth will develop. Self-worth is an important personal psychological resource. According to the theory of resource conservation, stressful events consume individuals' psychological resources, thus inducing mental health and adaptation problems [26]. Left-behind children who are in a poor family environment with multiple risks will experience a lack of security and support, which weakens their psychological resources and thus affects their perception and evaluation of their value and consequently impacts their social adaptation. Therefore, a negative family environment can have a negative effect on the social adaptation of left-behind children by affecting their self-esteem. Therefore, both families and schools should prioritize enhancing children's sense of self-worth. Parents should increase the frequency and quality of communication with left-behind children. Even when living apart, they can use video calls or other means to regularly discuss their children's lives and academic progress, while listening to their thoughts and feelings. This helps children feel cared for and valued, thereby boosting their sense of self-worth. Teachers should pay attention to the characteristics and needs of each left-behind child and implement personalized educational activities. For children struggling academically, targeted tutoring should be provided; for those with special talents, opportunities to showcase their abilities should be offered. This ensures that every child can shine in their area of strength, fostering self-identity and confidence.

The chain-mediated effects of teacher support and sense of self-worth

This study revealed that teacher support and a sense of self-worth play a chain mediating role between family cumulative risk and the social adaptation of left-behind children and that teacher support significantly positively predicts the sense of self-worth of left-behind children. Sun and Shi emphasized the importance of teachers in shaping students' self-cognition and emotional state [60]. For left-behind children, teachers' support includes both material support and emotional care. Material support can provide left-behind children with the resources and guidance they need to better cope with life challenges, whereas emotional support can enhance left-behind children's motivation and belief in success, thereby increasing their sense of self-worth. Therefore, when left-behind children can obtain instrumental and emotional support from teachers, they can regulate their emotional state to a certain extent, thus improving their sense of self-worth. This is also in line with the theory of the teacher expectation effect transmission model proposed by Brophy: When teachers provide more support to children, students can adjust their existing sense of self-worth through the class environment, and teachers can also output new support by observing children's behaviors, further affecting their sense of self-worth [61]. External help and a positive attitude can affect left-behind children's views of society. When an individual perceives a good interpersonal environment and organizational relationship, he or she will be motivated to act altruistically [62], thus generating a sense of belonging [63]. By establishing positive teacher–student relationships, left-behind children can obtain external support and internal recognition, thus improving their social adaptation ability. Therefore, teachers are not only knowledge imparted but also important facilitators of students' mental health and development. Their support and care play irreplaceable roles in students' growth.

Contributions and limitations of this study

Against the backdrop of the growing global attention on adolescent development and well-being, this study is of significant value. Firstly, unlike previous research that has mainly focused on the impact of a single or a specific category of family risk factors on adolescents, this study classifies the family risk factors affecting adolescents in more detail. It explores the relationships between different types of risk factors and their mechanisms influencing the social adaptation of left-behind children. The study conducts a comprehensive exploration of family risks and mediating variables, and reveals that teacher support and self - worth play mediating roles. This finding emphasizes the crucial role of teachers in improving the social adaptation of left - behind children and highlights the universal significance of self-perception and self-worth for their psychological well-being. Secondly, from a practical perspective, the conclusions of this study serve as a theoretical basis for educational departments around the world to formulate targeted support programs. They offer

valuable guidance for promoting the mental health and social adaptation of left-behind children, thus making a positive contribution to their overall development.

Although some meaningful findings have been obtained, this study has certain limitations that need improvement in future research. First, cross-sectional research cannot investigate the change characteristics and causality of each variable over time, and longitudinal research can be conducted to verify this study's conclusions further. Second, the cumulative risk model adopted in this study did not consider the weight of each risk factor. In the future, the predictive power of each specific risk factor for social adaptation can be deeply analyzed to determine the level of family risk factors. Thirdly, all the data in this study were self-reported by primary school students. Owing to limited understanding and cognitive ability, reporting bias may exist. In the future, the data can be collected by combining multiple other assessment methods (parent reports, teacher evaluations, etc.). Fourth, the family physical risk questionnaire used in this study exhibited relatively low reliability, which may have led to increased measurement error, weakened the strength of relationships between variables, and reduced the statistical power of the study. Although we attempted to control for errors through statistical methods in the data analysis, it may still not be possible to completely eliminate the impact of low reliability. Future research could employ more reliable and well-established measurement tools to enhance the accuracy and reliability of the findings. In addition, There are also some important but unmeasured variables that may affect the social adaptation of left-behind children, such as the specific family cultural atmosphere and peer relationships. Future research should pay attention to them.

Conclusion

There was a significant positive correlation between cumulative family risk and the social adaptation of left - behind children. Cumulative family risk factors directly impacted the social adaptation of left - behind children and indirectly influenced it through a chain mediation process involving teacher support and the development of their sense of self - worth. However, at that time, it could not be determined that there was a clear causal relationship among them. Although it could not be determined at present that there was a clear causal relationship among them. However, based on the complex influence of such cumulative family risks on the social adaptation of left-behind children, the school implemented projects to promote teacher-student relationships as buffer measures against family risk factors, so as to reduce the possible negative impacts of cumulative family risks on the social adaptation of left-behind children and help left-behind children better integrate into social life.

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Author contributions
Juan Zhang: conceptualization, data curation, formal analysis, writing-original draft, writing-revision & editing; Kemeng Lu: assisting with data curation, writing-original draft, writing-revision & editing; Yifu Wang: conceptualization, writing-revision & editing; Lili Wang: writing-revision & editing.

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Data availability
Data will be available from the corresponding author upon reasonable request.

Declarations

Ethical approval
This study was carried out in accordance with the recommendation of the Ethical Principles of Psychologists and Code of Conduct by the American Psychological Association (APA). All participants gave written informed consent in accordance with the Declaration of Helsinki. The employees' councils approved the protocol of the participating organizations and the ethics committee of Huaiyin Normal University. This research was approved by the Huaiyin Normal University Ethical Committee of the School of Education Science with approval number HNU-TSS-20240506-1.

Consent to participate
Consent for participation was obtained from the parents or legal guardians of any participant under the age of 16.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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References

1. Zhao J, Liu X, Zhang W. Peer rejection, peer acceptance and psychological adjustment of left-behind children: the roles of parental cohesion and children's cultural beliefs about adversity. Acta Physiol Sinica. 2013;45(7):797–81.
2. Wickramage K, Siriwardhana C, Peiris S. Promoting the health of left-behind children of Asian labour migrants: evidence for policy and action. Issue in brief No. 14. Bangkok and Washington DC, International Organization for Migration and Migration Policy Institute; 2015.
3. What the 2020 census can tell us about children in China. Facts and figures. https://www.stats.gov.cn/zsk/snapshoot?reference=2af5e433078f04afa4dd276ccda961e4_2329D8B73B9513A716347F77862D2A2D&siteCode=tjzsk
4. Peng M, Dai BR. Social adaptability of rural left-behind children and its influencing factors. Chin J Health Psychol. 2020;28(04):570–5.
5. Ortega L, Montalvo I, Monseny R, Vilella E, Labad J. Perceived stress mediates the relationship between social adaptation and quality of life in individuals at ultrahigh risk of psychosis. Early Interv Psychiat. 2019;13(6):1447–54.
6. Buehler C, Gerard JM. Cumulative family risk predicts increases in adjustment difficulties across early adolescence. J Youth Adolesc. 2013;42(6):905–20.
7. Gerard JM, Buehler C. Cumulative environmental risk and youth maladjustment: the role of youth attributes. Child Dev. 2004;75(6):1832–49.
8. Fergusson DM, Horwood LJ. Resilience to childhood adversity: results of a 21-year study. In: Luthar(Ed SS, editor. Resilience and vulnerability: adaptation in the contextof childhood adversities. Cambridge, UK: Cambridge University Press; 2003. pp. 130–55.
9. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ. Measuring risk and protective factors for use, delinquency, and other adolescent

problem behaviors: the communities that care youth survey. Eval Rev. 2002;26(6):575–601.
10. Xu MM, Fang YY, Ye CX. The impact of cumulative risk in early family life on internalization problems in adolescents. Psychol Dev Educ. 2022;36(06):793–803.
11. Bronfenbrenner U. The experimental ecology of education. Teachers Coll Record. 1976;78(2):1–37.
12. Bronfenbrenner U. Making human beings human: bioecological perspectives on human development. Thousand Oaks: Sage; 2005.
13. Xiong JM, Hai M, Huang F, Xin L, Xu Y. The relationship between family cumulative risk and adolescent mental health: the compensatory and moderating effects of psychological capital. Psychol Dev Educ. 2020;01:94–102.
14. Madigan S, Cyr C, Eirich R, Fearon RP, Ly A, Rash C, et al. Testing the cycle of maltreatment hypothesis: meta-analytic evidence of the intergenerational transmission of child maltreatment. Dev Psychopathol. 2019;31(1):23–51.
15. Ge HY, Liu AS. Cumulative family risk index and adolescents' self-injury behavior. Chin School Health. 2018;39(05):698–701.
16. Weymouth BB, Fosco GM, Feinberg ME. Nurturant-involved parenting and adolescent substance use: examining an internalizing pathway through adolescent social anxiety symptoms and substance refusal efficacy. Dev Psychopathol. 2019;31(1):247–60.
17. Iosim I, Runcan P, Runcan R, Jomiru C, Gavrila-Ardelean M. The impact of parental external labour migration on the social sustainability of the next generation in developing countries. Sustainability. 2022;14(8):4616.
18. Conger RD, Wallace LE, Sun Y, Simons RL, McLoyd VC, Brody GH. Economic pressure in African American families: a replication and extension of the family stress model. Dev Psychol. 2002;38(2):179.
19. Smith JP, Lei X, Shen Y, Zhou G. Fertility, gender preference, the birth planning policy and life satisfaction in China. J Popul Res. 2018;35(1):23–40.
20. Liu Y, Merritt DH. Familial financial stress and child internalizing behaviors: the roles of caregivers' maltreating behaviors and social services. Child Abuse Negl. 2018;86:324–35.
21. Lee SJ, Pace GT, Lee JY, Knauer H. The association of fathers' parental warmth and parenting stress to child behavior problems. Child Youth Serv Rev. 2018;91:1–10.
22. Zhao RJ. How do family socioeconomic status and parental parenting concepts influence their choice of parenting styles? —an empirical analysis based on CFPS data. Rev Educ Econ. 2024;9(04):90–111.
23. Kwag KH, Martin P, Russell D, Franke W, Kohut M. The impact of perceived stress, social support, and home-based physical activity on mental health among older adults. Int J Aging Hum Dev. 2011;72(2):137–54.
24. Gao J, Tang YF, Ao CX. Influence of teacher support on school adjustment of left-behind children in rural areas. J Shaanxi Pre-School Teachers Coll. 2021;37(09):120–6.
25. Jin Y. The influence of family functioning and teachers' emotional support on the well-being of left-behind children: a moderated mediation model. Adv Psychol. 2024;14(9):24–8.
26. Hobfoll SE. Conservation of resources: a new attempt at conceptualizing stress. Am Psychol. 1989;44(3):513–24.
27. Cui LJ, Xiao YM. Improving the social support system based on the rural revitalization strategy: countermeasures for promoting the social adaptation of left-behind children. J Soochow University: Educational Sci Ed. 2022;10(1):20–30.
28. Zhao LL. On school adaptation and social support for left-behind children in rural areas (Unpublished Doctoral thesis). East China Normal University. 2019.
29. Liu MM. The influence of peer trust on aggression in left-behind children. Progress Psychol. 2023;13(1):85–90.
30. Deng YL, Zhang Y, Li BL. The relationship between parental companionship and children's sense of self-worth: from the perspective of social capital theory. Res Educational Sci. 2018;04:61–6.
31. Zhang K, Na PY, Du XM. The relationship between parent-child attachment and creativity: the chain-mediating role of openness and creative self-efficacy. Chin J Clin Psychol. 2024;32(06):1311–3.
32. Li QM, Li Q. The relationship between family climate, self-esteem, and mental health: a three-year follow-up study. Psychol Dev Educ. 2025;01:77–85.
33. Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. J Pers Assess. 1990;55(3–4):610–7.
34. Chen DY, Yin YH, Wang YH, Li YL, Chen ZQ. The relationship between stress and creative self-efficacy: the mediating role of perceived teacher support for self-esteem. School Psychol. 2023;21(04):276–82.
35. Silver RB, Measelle JR, Armstrong JM, Essex MJ. Trajectories of classroom externalizing behavior: contributions of child characteristics, family characteristics, and the teacher–child relationship during the school transition. J Sch Psychol. 2005;43(1):39–60.
36. Xue LL, Jiang Y. Self-regulated learning and self-esteem in high school students: perceived teacher support and the moderating role of gender. New Insights Psychol. 2020;46(06):562–7.
37. Xu MM, Ye CX, Fang YY. The impact of early cumulative family risk on adolescents' internalization problems: the elastic dual mechanism. Res Psychol Behav. 2020;18(03):361–8.
38. Evans GW, Li D, Whipple SS. Cumulative risk and child development. Psychol Bull. 2013;139(6):1342–96.
39. Loucks EB, Almeida ND, Taylor SE, Matthews KA. Childhood family psychosocial environment and coronary heart disease risk. Psychosom Med. 2011;73(7):563–71.
40. Raja SN, McGee R, Stanton WR. Perceived attachments to parents and peers and psychological well-being in adolescence. J Youth Adolesc. 1992;21:471–85.
41. Li P, Zhang L. Understanding the application of social support scale in Kazakh population survey. China Health Stat. 2014;31(01):96–7.
42. Miu HL, Guo C, Wang TY, Liu XM, Zhang YZ. On reliability and validity evaluation and application of the children and adolescent social adaptation questionnaire. J Southwest China Normal Univ (Natural Sci Edition). 2021;46(10):106–13.
43. Zhao LL, Jiang BJ, Li K. How teacher support affects left-behind children's learning adaptation in rural areas: a study from a county perspective. Res Teacher Educ. 2020;32(02):102–9.
44. Huang XT, Yang X. Development of self-worth scale for young students. Psychol Sci. 1998;21(04):289–92.
45. Liu Y, Peng C, Chen JW. The relationship between cumulative family risk and learning burnout in vocational college students. Chin J Health Psychol. 2021;02:301–5.
46. Wang YL, Yuan Y, Zhang JX. Negative emotions and self-injury in left-behind adolescents: the moderating role of family functioning and emotional expression. Chin J Clin Psychol. 2017;25(01):75–8.
47. Zhang YL. Review of research on mental health education for left-behind children. Mental Health Educ Prim Secondary Schools. 2023;06:4–9.
48. Xiang W, Xiao HS. Effect of family function on emotional health of rural left-behind children. J Hunan Agricultural Univ (Social Sci Edition). 2018;06:43–8.
49. Xiong J, Fang X, Wang J, Xie W, Liu M, Niu G. Family cumulative risk, life satisfaction, and anxiety and depression in adolescents: a developmental cascades model. J Adolesc. 2024;96(7):1445–57.
50. Evans GW, Cassells RC. Childhood poverty, cumulative risk exposure, and mental health in emerging adults. Clin Psychol Sci. 2014;2(3):287–96.
51. Rao D, Liu YL, Geng YB, Lin J. The relationship between family closeness and social adjustment of left-behind children under the COVID-19 pandemic: a multimediating model. J Southwest Univ (Natural Sci Edition). 2022;08:28–36.
52. Li XN. A study on the relationship between teacher support, delayed gratification and students' grit development. School Party Building Ideological Educ. 2020;06:92–4.
53. Jing MJ, Zhong YL, Yang H. The influence of family socioeconomic status on the life satisfaction of left - behind children: the mediating role of perceived teacher support. J Chengdu Univ Traditional Chin Med (Educational Sci Edition). 2023;25(04):119–23.
54. Smith AB, Johnson CD. The mediating role of self-esteem in the relationship between childhood family environment and social adaptation in adulthood. J Fam Psychol. 2018;32(4):492–501.
55. John OP, Robins RW, Pervin LA, editors. Handbook of personality: theory and research. Guilford Press; 2010.
56. Huang XT, Feng SH, Wang WH. Development of national norms for adolescent students' sense of self-worth. Psychol Sci. 2003;26(02):194–8.
57. Xie FZ, Wang Y, Wu SS. The mediating role of college students' self-worth in the relationship between parenting style and interpersonal relationship. J Hefei Univ (Comprehensive Edition). 2020;37(04):141–4.
58. Maunder R, Monks C. Are you my friend too? The role of reciprocal friendship: links to friendship quality, peer and school identification and general self-worth. British Psychological Society, Psychology of Education Section Annual Conference: The Role of Competence Beliefs in Teaching and Learning. 2015.
59. Wu ZB. A study on the relationship between college students' positive development and their parents' parenting style and sense of self-worth. J Chongqing Technol Bus Univ (Social Sci Edition). 2018;04:117–22.

60. Sun Y, Shi W. On the role of teacher-student rapport and teacher support as predictors of Chinese EFL students' affective learning. Front Psychol. 2022;13:856–64.
61. Good TL, Brophy JE. Teacher-child dyadic interactions: a new method of classroom observation. J Sch Psychol. 1970;8(2):131–8.
62. Wei SG, Sun WQ, Chen J, Sun JX. Family environment and prosocial behavior of college students: a moderating mediating role. Chin J Clin Psychol. 2017;25(04):743–6.
63. Klein N. Prosocial behavior increases perceptions of meaning in life. J Posit Psychol. 2017;12(4):354–61.

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