



# Effect of Family Cohesion on Aggression among Chinese Middle School Students: The Mediating Role of Psychological Suzhi

Xu Wang<sup>1,2</sup> · Yi-bo Geng<sup>1,2</sup> · Jie Lin<sup>1,2</sup> · Zhen-shuo Yi<sup>1,2</sup> · Yan-ling Liu<sup>1,2</sup>

Accepted: 11 February 2022 / Published online: 14 March 2022

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2022

## Abstract

This study was based on ecological systems theory, combined with the concept of localization put forward by Chinese scholars, to explore the influence of the family (family cohesion) and personal (psychological suzhi) factors on middle school students' aggression. A total of 20,114 middle school students aged 12 to 18 years ( $M = 14.30$ ,  $SD = 1.40$ ) completed the Family Cohesion Questionnaire, the Psychological Suzhi Questionnaire, and the Chinese Version of Buss and Perry Aggression Questionnaire. The results indicated that there were significant negative correlations among family cohesion, psychological suzhi, and overall aggression along with its components. Additionally, psychological suzhi significantly mediated the relationship between family cohesion and aggression and its sub-dimensions. These results highlighted the important roles of family cohesion and psychological suzhi in adolescents' behavioral development and provided potential strategies to reduce middle school students' aggression.

**Keywords** Family cohesion

## Introduction

As a kind of social behavior, aggression has attracted the attention of many researchers. Common aggressive

behaviors in childhood and adolescence (Works, 2015) can have a serious impact on students' mental health (Brunstein Klomek et al., 2007; Ivarsson et al., 2005; Undheim & Sund, 2010), social adaptation (Chen et al., 2010), interpersonal relationships (Jenkins et al., 2017), and academic achievement (Zinatmotlagh et al., 2013). Meanwhile, aggressive behavior remains stable over the long term (Chen et al., 2010; Musci et al., 2013). It predicts adolescents' future drug abuse, criminal activity, and other antisocial behaviors (Barker et al., 2008; Brunstein Klomek et al., 2007; Ryan & Smith, 2009; Sourander et al., 2007; Yabiku et al., 2010). Victims of aggression also may develop depression and suicidal ideation (Brunstein Klomek et al., 2007) and may even act on their suicidal thoughts (Peng et al., 2019). Therefore, understanding the influences and mechanisms of adolescent aggression is an important prerequisite for educators to implement appropriate preventive measures and interventions.

According to ecological systems theory, the family environment is crucial for children's development (Bronfenbrenner, 1986). Family is the core factor affecting

- 
- ✉ Yan-ling Liu  
ssq@swu.edu.cn
  - ✉ Xu Wang  
wx786753429@163.com
  - ✉ Yi-bo Geng  
997761094@qq.com
  - ✉ Jie Lin  
791275819@qq.com
  - ✉ Zhen-shuo Yi  
2848611266@qq.com

<sup>1</sup> The Lab of Mental Health and Social Adaptation, Faculty of Psychology, Southwest University, 400715 Chongqing, China

<sup>2</sup> Research Center of Mental Health Education, Southwest University, Tiansheng Road No. 2, Chongqing, China

externalization and internalization of adolescents (Marsiglia et al., 2009; Reeb et al., 2015). Family dysfunction may induce behavioral problems, including aggression, in children (Dreman & Ronen-Eliv, 1997; Estevez et al., 2016; Withers et al., 2016). Family has always been valued by the Chinese people and harmony in a family makes everything successful. Family cohesion, as an important index of the whole family's functionality (Richmond & Stocker, 2006), has been defined as the emotional bonds among family members (Marsiglia et al., 2009; Rivera et al., 2008; Tolan et al., 1997).

Several studies have shown that family cohesion is a protective factor (Goodrum et al., 2020; Gorman-Smith et al., 2004; Henneberger et al., 2013) against adolescent problem behaviors (Lucia & Breslau, 2006). Specifically, research has uncovered a significant negative correlation between family cohesion and adolescents' overall aggression (Elam et al., 2018) as well as its three dimensions—cognition, emotion, and behavior (Cai & Zhang, 2019). Hamama and Arazi (2012) surveyed 111 Israeli children aged 9–13 years using Buss and Perry's (1992) aggression questionnaire. They found a significant negative correlation between family cohesion and children's physical aggression, verbal aggression, anger, and hostility. However, middle school students have not fully matured physically and psychologically, and most have not lived independently of their parents. Therefore, the influence of family on adolescents' aggression is especially worthy of our consideration.

Chinese scholars have proposed a cultural concept called psychological *suzhi*. Psychological *suzhi* refers to a psychological quality that is based on physiological conditions, internalizing external stimuli into stable, basic, implicit, derivative, and developmental functions; further, it is closely related to people's adaptive and creative behavior (Zhang, 2003). Psychological *suzhi* has been included in the *Handbook of Positive Psychology in Schools (Second Edition)* and is recognized by foreign scholars (Furlong et al., 2014). It has three dimensions. First, the cognitive quality directly participates in the concrete operation of the cognitions of objects, which is the basic component of psychological *suzhi*. Second, the personality quality has power over and regulates the functioning of cognitive operations, and it is the dynamic component of psychological *suzhi*. Third, adaptability is the habitual behavior of individuals in the process of adapting to environmental changes (Zhang, 2009; Zhang et al., 2011).

Ecological systems theory posits that people's external behaviors are the result of interactions between the individual and the environment (Bronfenbrenner, 1986). Chinese scholars proposed the relationship model between psychological *suzhi* and mental health (Zhang, 2012), which includes two interrelated levels: psychological *suzhi*

(internal mechanism) and mental state (explicit behavior). In terms of individual mental health, the former determines the latter, while the latter reacts on the former. The model also believes that external pathogenic risk factors or external gain protective factors play an important role through internal psychological *suzhi* (Wang & Zhang, 2012). As has been shown in previous studies, psychological *suzhi* is a protective factor (Liu et al., 2017; Wang & Zhang, 2012), it negatively predicts adolescent problem behaviors (Liu et al., 2017; Liu et al., 2019; Zhang & Wang, 2020) and reduces adolescents' likelihood of experiencing depression (Hu & Zhang, 2015). In addition, studies have shown that family cohesion positively predicts the psychological *suzhi* of children and adolescents (Miao et al., 2021; Zhao et al., 2017). Strong family relationships and warm, harmonious family atmospheres are pivotal in the development of psychological *suzhi* in primary and middle school students. Therefore, we assumed that psychological *suzhi* may play a mediating role in the relationship between family cohesion and aggression.

In summary, based on ecological systems theory, this study explored the influence of family cohesion and psychological *suzhi* on the aggression of Chinese middle school students. Additionally, because aggression has multiple dimensions (cognition, emotion, and behavior), it is far too limiting to measure only the impact of these variables on *overall* aggression. Therefore, we used a structural equation model to investigate the relationships among family cohesion, psychological *suzhi*, and aggression and its sub-dimensions. Specifically, we put forward three hypotheses:

**Hypothesis 1** Family cohesion will negatively predict middle school students' overall aggression and its sub-dimensions (physical aggression, verbal aggression, anger, hostility, and self-aggression).

**Hypothesis 2** Psychological *suzhi* will negatively predict middle school student's overall aggression and its sub-dimensions.

**Hypothesis 3** Psychological *suzhi* will mediate the relationship between family cohesion and aggression and its sub-dimensions.

## Methods

### Participants

In this study, junior high school students and senior high school students were investigated by online questionnaire

from April to May 2020. Specifically, first of all, the head teacher sent the link of the questionnaire to the class WeChat group, in which the parents or legal guardians of students of the whole class were included. Then, the parents or legal guardians gave the phone to the children. Finally, the middle school students volunteered to participate in the survey and completed the questionnaire. The Ethics Committee of Southwest University Faculty of Psychology approved this study.

We imported all data into SPSS, then deleted duplicate information, random responses, responses submitted too rapidly (less than 300s) and too slowly (more than 2000s), and untrue data from the polygraph items. A total of 20,114 (9,239 males, 10,875 females) middle school students in Sichuan and Chongqing completed our online questionnaires. The participants' ages ranged from 12 to 18 years ( $M = 14.30$ ,  $SD = 1.40$ ). Table 1 presents all descriptive statistics for background variables.

## Measures

### Family Cohesion

The family cohesion scale is a subscale of Family Adaptability and Cohesion Evaluation Scale (FACESII- CV). FACESII- CV was compiled by Olson et al. (1982) and translated by Chinese scholar (Fei et al., 1991) into Chinese version. The family cohesion scale selected in this study is one-dimensional. The scale comprises 16 items (e.g., “The relationship between family members is very close”; “Family members can share each other’s interests and hobbies”). Items are rated on a 5-point Likert scale. Higher scores indicate closer emotional relationships among family members. In the previous study, Cronbach’s alpha of the family cohesion subscale was 0.91 (Zhai et al., 2021). In the present study, the scale demonstrated high reliability (Cronbach’s  $\alpha = 0.89$ ).

### Psychological Suzhi Questionnaire (Simplified Version)

We utilized the Psychological Suzhi Questionnaire edited by Hu et al. (2017). It has three dimensions—cognitive quality, individuality quality, and adaptability quality—and comprises 24 items (e.g., “I usually do my own things on my own”; “No matter how urgent the situation is, I can deal with it calmly”; “I am good at combining old and new knowledge”). Items are rated on a 5-point Likert scale (1 = *totally disagree*, 5 = *totally agree*). Higher scores indicate greater psychological suzhi for the individual. In the previous study, its Cronbach’s alpha was 0.92 (Zhao et al., 2021). In the present study, the scale demonstrated high reliability (Cronbach’s  $\alpha = 0.96$ ).

**Table 1** Descriptive statistics for background variables

	N	%		N	%
<b>Gender</b>			<b>Father education</b>		
Males	9239	45.9	Elementary school	4099	20.4
Females	10,875	54.1	Secondary school	10,343	51.4
<b>Grade</b>			High school	4063	20.2
7	6384	31.7	University	1561	7.8
8	5713	28.4	Postgraduate	48	0.2
9	3374	16.8	<b>Mother education</b>		
10	2490	12.4	Elementary school	5707	28.4
11	1742	8.7	Secondary school	9520	47.3
12	411	2.0	High school	3547	17.6
<b>Only Child</b>			University	1311	6.5
Yes	5881	29.2	Postgraduate	29	0.1
No	14,233	70.8	<b>Left-behind child</b>		
<b>Family residence</b>			Yes	5725	28.5
Rural	8025	39.9	No	14,389	71.5
Cities and towns	12,089	60.1			

### Chinese Version of Buss and Perry’s Aggression Questionnaire

The aggression questionnaire was compiled by Buss and Perry (1992). It measures individual aggression from three dimensions: cognition, emotion, and behavior. Scholars have translated and revised the questionnaire to apply to Chinese individuals, and eventually created a new Chinese version (Li et al., 2011). The Chinese version of the questionnaire, which we used in this study, contains five subscales: physical aggression, verbal aggression, anger, hostility, and self-aggression. The questionnaire consists of 30 items. Items are rated on a 5-point Likert scale (1 = *completely disagree*, 5 = *completely agree*). Higher scores indicate higher levels of aggression. In the previous study, its Cronbach’s alpha was 0.91 (Ren et al., 2020). In the present study, the scale demonstrated high reliability (Cronbach’s  $\alpha$ : total scale = 0.96, physical aggression = 0.86, verbal aggression = 0.80, anger = 0.86, hostility = 0.86, self-aggression = 0.84).

### Data Processing

We used SPSS 25.0 and Mplus 8.3 for all data processing and analyzing. To avoid common method bias’s interference with the research results, we used the Harman single factor test (Podsakoff et al., 2003) to measure the common method’s degree of variation. The test resulted in eleven eigenvalues greater than 1 for all factors; the first factor accounted for 20.36% of the variance (less 40%). This supported the findings which related to the predecessors’ judgment conditions (Ashford & Tsui, 1991). Then, by using confirmatory factor analysis and Maximum Likelihood, we loaded all the measured items onto a common latent factor,

**Table 2** Descriptive Statistics and Correlations among Study Variables

	1	2	3	4	5	6	7	8
1. FC	1							
2. Suzhi	0.521**	1						
3. AGG	-0.348**	-0.345**	1					
4. PA	-0.280**	-0.274**	0.883**	1				
5. VA	-0.248**	-0.260**	0.863**	0.755**	1			
6. Anger	-0.292**	-0.316**	0.904**	0.730**	0.763**	1		
7. Hostility	-0.362**	-0.345**	0.898**	0.700**	0.700**	0.759**	1	
8. SA	-0.348**	-0.321**	0.873**	0.706**	0.660**	0.742**	0.773**	1
<i>M</i>	3.37	3.44	2.21	2.07	2.21	2.34	2.3	2.15
<i>SD</i>	0.71	0.69	0.8	0.86	0.83	0.95	0.9	0.94

Note. *N* = 20,114. \* *p* < .05, \*\* *p* < .01, \*\*\* *p* < .001

**Table 3** Results of independent sample t-test and one-way ANOVA of variables

	FC	Suzhi	AGG	PA	VA	Anger	Hostility	SA
<b>Gender</b>								
Male	3.4 ± 0.68	3.47 ± 0.7	2.22 ± 0.8	2.18 ± 0.88	2.28 ± 0.84	2.26 ± 0.92	2.27 ± 0.88	2.12 ± 0.92
Female	3.35 ± 0.74	3.41 ± 0.67	2.21 ± 0.79	1.98 ± 0.83	2.15 ± 0.81	2.4 ± 0.98	2.32 ± 0.92	2.19 ± 0.97
<i>t</i>	4.61***	6.12***	1.53	16.57***	11.52***	-10.27***	-4.4***	-5.01***
<b>Only Child</b>								
Yes	3.41 ± 0.73	3.48 ± 0.7	2.17 ± 0.78	2.04 ± 0.86	2.17 ± 0.82	2.3 ± 0.95	2.26 ± 0.9	2.09 ± 0.94
No	3.36 ± 0.7	3.42 ± 0.68	2.23 ± 0.8	2.08 ± 0.86	2.22 ± 0.83	2.35 ± 0.95	2.32 ± 0.91	2.18 ± 0.95
<i>t</i>	5.27***	5.6***	-4.65***	-3.04***	-3.68***	-3.5***	-4.34***	-6.32***
<b>Family residence</b>								
Rural	3.33 ± 0.68	3.39 ± 0.68	2.26 ± 0.8	2.12 ± 0.87	2.27 ± 0.83	2.37 ± 0.93	2.34 ± 0.89	2.21 ± 0.94
Cities and towns	3.4 ± 0.73	3.48 ± 0.69	2.18 ± 0.79	2.04 ± 0.85	2.17 ± 0.82	2.32 ± 0.96	2.27 ± 0.91	2.12 ± 0.95
<i>t</i>	-7.17***	-9.02***	6.56***	5.74***	8.15***	4.09***	5.21***	6.8***
<b>Left-behind child</b>								
Yes	3.29 ± 0.69	3.36 ± 0.69	2.28 ± 0.8	2.12 ± 0.87	2.27 ± 0.83	2.4 ± 0.94	2.36 ± 0.9	2.24 ± 0.95
No	3.4 ± 0.72	3.47 ± 0.68	2.19 ± 0.79	2.05 ± 0.86	2.18 ± 0.82	2.31 ± 0.95	2.27 ± 0.9	2.12 ± 0.94
<i>t</i>	-10.23***	-10.03***	6.87***	4.89***	6.41***	5.82***	6.14***	7.76***
<b>Grade</b>								
7	3.4 ± 0.73	3.51 ± 0.7	2.25 ± 0.81	2.12 ± 0.88	2.25 ± 0.84	2.37 ± 0.96	2.32 ± 0.91	2.19 ± 0.96
8	3.38 ± 0.73	3.5 ± 0.71	2.19 ± 0.81	2.04 ± 0.87	2.17 ± 0.84	2.31 ± 0.96	2.28 ± 0.92	2.13 ± 0.96
9	3.37 ± 0.68	3.45 ± 0.69	2.21 ± 0.8	2.06 ± 0.85	2.22 ± 0.83	2.32 ± 0.95	2.29 ± 0.91	2.14 ± 0.94
10	3.32 ± 0.69	3.25 ± 0.61	2.2 ± 0.75	2.04 ± 0.82	2.15 ± 0.78	2.35 ± 0.95	2.29 ± 0.87	2.16 ± 0.91
11	3.33 ± 0.67	3.26 ± 0.62	2.22 ± 0.74	2.09 ± 0.81	2.21 ± 0.76	2.34 ± 0.91	2.31 ± 0.86	2.14 ± 0.89
12	3.31 ± 0.57	3.33 ± 0.55	2.22 ± 0.79	2.12 ± 0.84	2.21 ± 0.83	2.3 ± 0.9	2.28 ± 0.86	2.19 ± 0.92
<i>F</i>	7.2***	89.15***	4.09**	6.64***	8.64***	3.1**	0.91	2.94*
<b>Father education</b>								
Elementary school	3.26 ± 0.69	3.33 ± 0.69	2.31 ± 0.81	2.15 ± 0.88	2.29 ± 0.85	2.44 ± 0.95	2.4 ± 0.91	2.29 ± 0.96
Secondary school	3.36 ± 0.7	3.44 ± 0.69	2.21 ± 0.79	2.07 ± 0.86	2.21 ± 0.82	2.34 ± 0.95	2.3 ± 0.9	2.15 ± 0.94
High school	3.45 ± 0.71	3.51 ± 0.68	2.15 ± 0.78	2.03 ± 0.84	2.14 ± 0.81	2.27 ± 0.95	2.22 ± 0.9	2.09 ± 0.94
University	3.54 ± 0.75	3.6 ± 0.68	2.13 ± 0.77	2.02 ± 0.85	2.16 ± 0.81	2.28 ± 0.98	2.21 ± 0.91	2 ± 0.92
Postgraduate	3.46 ± 0.66	3.72 ± 0.62	2.25 ± 0.92	2.2 ± 0.92	2.18 ± 0.88	2.33 ± 1.08	2.34 ± 0.99	2.19 ± 1.07
<i>F</i>	60.46***	62.48***	26.45***	13.91***	18.49***	18.19***	24.63***	35.35***
<b>Mother education</b>								
Elementary school	3.27 ± 0.7	3.33 ± 0.68	2.28 ± 0.8	2.12 ± 0.87	2.27 ± 0.83	2.4 ± 0.94	2.38 ± 0.9	2.25 ± 0.94
Secondary school	3.37 ± 0.7	3.45 ± 0.69	2.21 ± 0.79	2.06 ± 0.85	2.2 ± 0.82	2.33 ± 0.95	2.29 ± 0.9	2.15 ± 0.94
High school	3.46 ± 0.72	3.53 ± 0.68	2.16 ± 0.79	2.04 ± 0.86	2.15 ± 0.82	2.29 ± 0.95	2.23 ± 0.92	2.07 ± 0.94
University	3.57 ± 0.77	3.61 ± 0.7	2.11 ± 0.78	1.99 ± 0.85	2.13 ± 0.83	2.24 ± 1	2.18 ± 0.91	2.01 ± 0.94
Postgraduate	3.5 ± 0.65	3.77 ± 0.59	2.05 ± 0.95	2.04 ± 1	2.14 ± 1.03	2.16 ± 1.12	2.1 ± 1	1.77 ± 0.96
<i>F</i>	70.01***	78.99***	21.37***	9.2***	14.22***	13.33***	21.9***	31.47***

the results showed that the fit was poor ( $\chi^2 / df=186.52$ , RMSEA=0.096, CFI=0.486, TLI=0.471, SRMR=0.138) (RMSEA, SRMR < 0.08, and CFI, TLI > 0.09 is good) (Hu & Bentler, 1999). Thus, there was no evidence of serious common method bias in this study.

## Results

### Preliminary Analysis

Table 2 shows the results of the correlational analysis of family cohesion, psychological suzhi, and aggression. Specifically, there was a significant positive correlation between family cohesion and psychological suzhi. Family cohesion and psychological suzhi both were significantly negatively correlated with total aggression and its sub-dimensions. There were also positive correlations between total aggression and each of its sub-dimensions (Table 2).

In addition, in order to avoid the interference of irrelevant variables to the research results. Independent sample t-tests were conducted on family cohesion, psychological suzhi, aggression and its sub-dimensions in terms of gender, only children, family residence and left-behind child. And one-way ANOVA was carried out on grade, father education and mother education. The results showed that there were significant differences in other variables under different conditions, except that there was no significant difference in aggression in gender and hostility in age (Table 3). Therefore, this study took gender, only child, family residence, left-behind child, grade, father education and mother education as control variables.

FC=family cohesion, Suzhi=psychological suzhi, AGG=aggression, PA=physical aggression, VA=verbal aggression, SA=self-aggression.

### Testing the Proposed Model

First, we tested the direct effect of family cohesion on aggression. The results indicated a good model fit ( $\chi^2 / df=85.57$ , RMSEA=0.065, CFI=0.967, TLI=0.954, SRMR=0.019). After controlling only child, family residence, left-behind child, grade, father education and mother education, family cohesion significantly predicted aggression ( $\beta = -0.361$ ,  $p < .01$ ). Given this result, we could test for mediating effects in the model. We added gender as a control variable and psychological suzhi as a mediating variable, found that the new model had good fit ( $\chi^2 / df=78.70$ , RMSEA=0.04, CFI=0.962, TLI=0.9, SRMR=0.026). Figure 1 shows the results after controlling for age, gender, only-child status, family residence, and left-behind child status. We found that (1) family cohesion significantly negatively predicted

aggression ( $\beta = -0.230$ ,  $p < .01$ ) and positively predicted psychological suzhi ( $\beta = 0.506$ ,  $p < .01$ ), as well as that (2) psychological suzhi significantly negatively predicted aggression ( $\beta = -0.257$ ,  $p < .05$ ).

Using the bias-corrected bootstrap method, we generated 5,000 samples. The results indicated that the bootstrapped 95% confidence interval of indirect effect did not include zero ( $\beta = -0.130$ ,  $SE=0.005$ ,  $t = -25.83$ , 95% CI = [-0.140, -0.120],  $p < .001$ ). Psychological suzhi had a significant mediating effect. The standardized mediating effect accounted for 36.11%.

*Note.* For the sake of brevity, the control variables are not marked in the model.

We conducted a structural equation model analysis with family cohesion as the independent variable, psychological suzhi as the mediating variable, the five sub-dimensions of aggression as dependent variables, and gender, only child, family residence, left-behind child, grade, father education and mother education as control variables. The results indicated that the model fitted the data well ( $\chi^2 / df=37.41$ , RMSEA=0.043, CFI=0.994, TLI=0.977, SRMR=0.011). Figure 2 shows the results. We found that family cohesion significantly negatively predicted physical aggression ( $\beta = -0.220$ ,  $p < .05$ ), verbal aggression ( $\beta = -0.169$ ,  $p < .05$ ), anger ( $\beta = -0.217$ ,  $p < .05$ ), hostility ( $\beta = -0.309$ ,  $p < .05$ ), and self-aggression ( $\beta = -0.318$ ,  $p < .05$ ). Additionally, we found that psychological suzhi significantly negatively predicted physical aggression ( $\beta = -0.240$ ,  $p < .05$ ), verbal aggression ( $\beta = -0.234$ ,  $p < .05$ ), anger ( $\beta = -0.331$ ,  $p < .05$ ), hostility ( $\beta = -0.289$ ,  $p < .05$ ), and self-aggression ( $\beta = -0.268$ ,  $p < .05$ ).

Again, using the bias-corrected bootstrap method, we generated 5,000 samples. The result indicated that the bootstrapped 95% confidence intervals of the five mediation paths did not include zero (physical aggression: [-0.133, -0.110]; verbal aggression: [-0.130, -0.107]; anger: [-0.181, -0.155]; hostility: [-0.159, -0.135]; self-aggression: [-0.148, -0.123]). This demonstrated that the effect of psychological suzhi in each of the five intermediary paths was significant (Table 4).

Next, we compared the values of the indirect effect, direct effect, and total effect. For the indirect effect, there were significant differences among all paths except between the physical aggression and verbal aggression paths ( $\beta =$

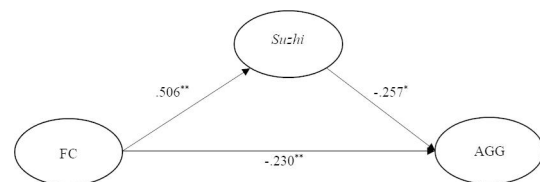
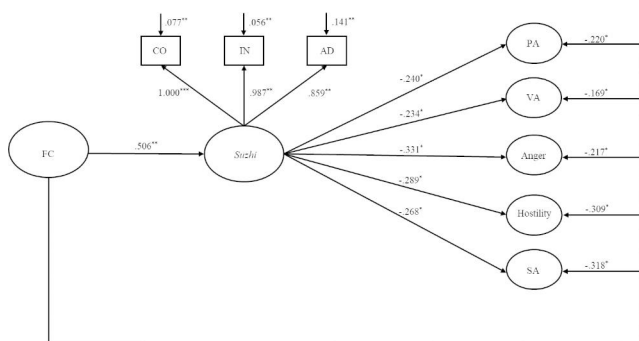


Fig. 1 Structural Equation Model of Total Aggression



**Fig. 2** Structural Equation Model of the Sub-Dimensions of Aggression

– 0.003, *SE* = 0.004, *t* = – 0.838, 95% *CI* = [–0.011, 0.004]). The indirect effect of anger was the strongest. For the direct effect, there were significant differences among all paths except between the physical aggression and anger paths ( $\beta = -0.003, SE = 0.009, t = -0.316, 95\% CI = [-0.020, 0.014]$ ) and between the hostility and self-aggression paths ( $\beta = 0.010, SE = 0.008, t = 1.40, 95\% CI = [-0.007, 0.026]$ ). The direct effects of hostility and self-aggression were the strongest. For the total effect, there were significant differences among all paths except between the hostility and self-aggression paths ( $\beta = 0.001, SE = 0.007, t = -0.201, 95\% CI = [-0.015, 0.013]$ ). The total effects of hostility and self-aggression were the strongest.

*Note.* For the sake of brevity, the control variables are not marked in the model.

Ind1 = family cohesion → psychology suzhi → physical aggression.

Ind2 = family cohesion → psychology suzhi → verbal aggression.

Ind3 = family cohesion → psychology suzhi → anger.

Ind4 = family cohesion → psychology suzhi → hostility.

Ind5 = family cohesion → psychology suzhi → self-aggression.

### Discussion

Based on ecological systems theory, this study explored the interaction between individual traits and environment, examining the influences of family cohesion and psychological suzhi on aggression in Chinese middle school students. We found that family cohesion and psychological suzhi were significantly negatively correlated with overall aggression, physical aggression, verbal aggression, anger, hostility, and self-aggression. This result supported Hypotheses 1 and 2. More importantly, we found that the effect of family cohesion on overall aggression and its sub-dimensions is mediated by psychological suzhi, which supported Hypothesis 3. In a word, our research results show that family cohesion and psychological suzhi play important roles in the development of aggression in middle school students.

This study’s results are consistent with previous research findings. Previous research has found that family cohesion

**Table 4** Tests of Bootstrapped Standardized Intermediary Effects

Model	Estimate	SE	t	95% CI		Relative Mediating Effect	
				LL	UL		
Ind1	Total effect	– 0.342	0.008	–40.86	–0.358	–0.325	17.78%
	Direct effect	–0.220	0.010	–21.23	–0.241	–0.199	11.44%
	Indirect effect	–0.122	0.006	–20.80	–0.133	–0.110	6.34%
Ind2	Total effect	–0.287	0.008	–35.84	–0.302	–0.271	14.92%
	Direct effect	–0.169	0.010	–17.37	–0.188	–0.150	8.79%
	Indirect effect	–0.118	0.006	–20.76	–0.130	–0.107	6.14%
Ind3	Total effect	–0.385	0.009	–41.24	–0.403	–0.367	20.02%
	Direct effect	–0.217	0.011	–19.18	–0.239	–0.195	11.28%
	Indirect effect	–0.168	0.006	–25.83	–0.181	–0.155	8.74%
Ind4	Total effect	–0.455	0.009	–53.02	–0.472	–0.439	23.66%
	Direct effect	–0.309	0.010	–29.61	–0.328	–0.289	16.07%
	Indirect effect	–0.146	0.006	–24.31	–0.159	–0.135	7.59%
Ind5	Total effect	–0.454	0.009	–50.13	–0.471	–0.436	23.61%
	Direct effect	–0.318	0.011	–28.83	–0.339	–0.296	16.54%
	Indirect effect	–0.136	0.006	–21.83	–0.148	–0.123	7.07%

*Note.* LL = lower limit, UL = upper limit

negatively predicts adolescents' aggression (Cai & Zhang, 2019; Elam et al., 2018; Hamama & Arazi, 2012). This constitutes further evidence that the family plays an important role in individual growth and development. Family systems theory regards the family as a complete minimum unit, and family members are the core elements (Bowen, 1966). The degree of mutual support among family members is reflected by family cohesion (Barber & Buehler, 1996). Higher family cohesion means that there are more positive interpersonal relationships within the family, a harmonious communication atmosphere, and stronger emotional bonds among family members. Adolescents in highly cohesive families tend to receive greater emotional warmth and social support from family members. This reduces negative emotions, perceptions of hostility, and all kinds of aggressive behavior.

Family cohesion can not only directly affect adolescents' aggression but also influence their aggressive cognitions, emotions, and behaviors through mediator of psychological *suzhi*. As a psychological quality, individuals gradually develop psychological *suzhi* in interaction with the external environment (Zhang et al., 2011). When individuals interact with the external environment, they connect their effective new knowledge with the situation and transform it into a stable, implicit, and situational knowledge through subjective internalization mechanisms; this helps to realize the integration of personal experience and the experiences of others, and psychological *suzhi* becomes a relatively stable structure and function (Zhang et al., 2013). The family plays a key role in the development of adolescents' psychological *suzhi*. High family cohesion helps individuals absorb and internalize more positive qualities and knowledge in their familial interactions, leading to greater psychological *suzhi*, which in turn reduces adolescents' aggressive cognitions, emotions, and behaviors.

We also found that the indirect effect of anger was the strongest among all paths, and the direct effect and total effect of the hostility and self-aggression paths were the strongest. In other words, psychological *suzhi* has a greater effect on adolescents' aggressive emotions, and family cohesion has a greater effect on adolescents' aggressive cognitions and self-aggression. The theoretical models of psychological *suzhi*'s relationship with mental health (Zhang et al., 2011) highlight that mental health is the external manifestation of psychological *suzhi*, and psychological *suzhi* is an internal characteristic of mental health. Therefore, emotion, as a fundamental indicator of mental health (Zhang, 2019), is closely related to psychological *suzhi*. As previous studies have shown, greater psychological *suzhi* is associated with greater positive emotion and less negative emotion (Peng et al., 2020; Zhang & Zhang, 2019). The family is typically the individual's first social environment. Individuals learn

from close family members and then form their own cognitive tendencies and behavioral habits. Simultaneously, due to the protective effect of family cohesion (Goodrum et al., 2020; Gorman-Smith et al., 2004; Henneberger et al., 2013), individuals are less likely to engage in self-harm.

Of course, our study has some limitations, which can be addressed by future research. First, the research shows that the level of family cohesion decreases with age (Lin & Yi, 2019). Simultaneously, the amount of middle school students' academic activities increases gradually, as does peer influence. In the future, researchers should consider additional environmental variables to explore the influences and mechanisms of adolescent aggression more comprehensively. Second, psychological *suzhi* is the product of Chinese culture, and we are not sure whether it plays the same role in other countries. Finally, cross-sectional studies such as ours cannot clarify the causal relationships among variables, and longitudinal research design may provide a deeper understanding of how individual and environmental factors affect adolescent aggression.

## Conclusions

In short, our results support the protective roles of family cohesion and psychological *suzhi* in middle school students' behavioral development. Middle school students with high family cohesion have lower aggression, a relationship in which psychological *suzhi* plays a significant mediating role. Parents can provide emotional warmth and support as well as cooperate with teachers to adopt appropriate strategies (e.g., subject infiltration, home-school cooperation, etc.) to strengthen middle school students' psychological *suzhi*, which may help reduce aggression and the occurrence of problem behaviors.

**Acknowledgements** We want to thank the students who participated in, and we are grateful to the faculty and staff at the Research Center of Mental Health Education of Southwest University for their generous support.

**Authors' Contributions** Xu Wang contributed to conception and design of the study. Xu Wang wrote the manuscript, and Zhen-shuo Yi wrote the revised manuscript. Xu Wang, Jie Lin and Yi-bo Geng collected the data of the study. Yan-ling Liu wrote sections of the manuscript. All authors contributed to manuscript revision, and approved the submitted version.

**Funding** The research was supported by Fundamental Research Funds for the Central Universities (SWU1909223).

## Declarations

**Conflict of interest** The authors declare that the research was conducted in the absence of any commercial or financial relationships that

could be construed as a potential conflict of interest.

## References

- Ashford, S. J., & Tsui, A. S. (1991). Self-regulation for managerial effectiveness: The role of active feedback seeking. *Academy of Management Journal*, 34(2), 251–280
- Barber, B. K., & Buehler, C. (1996, May). Family cohesion and enmeshment: Different constructs, different effects. *Journal of Marriage and the Family*, 58(2), 433–441
- Barker, E. D., Arseneault, L., Brendgen, M., Fontaine, N., & Maughan, B. (2008, Sep). Joint development of bullying and victimization in adolescence: relations to delinquency and self-harm. *Journal of the American Academy of Child and Adolescent Psychiatry*, 47(9), 1030–1038
- Bowen, M. (1966). The use of family theory in clinical practice. *Comprehensive Psychiatry*, 7(5), 345–374
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development: Research perspectives. *Development Psychology*, 22(6), 723–742
- Brunstein Klomek, A., Marrocco, F., Kleinman, M., Schonfeld, I. S., & Gould, M. S. (2007, Jan). Bullying, depression, and suicidality in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(1), 40–49
- Cai, X., & Zhang, J. (2019). A related study of aggressive behavior and family in junior middle school students. *Journal of Psychiatry*, 32(1), 49–52
- Chen, X., Huang, X., Chang, L., Wang, L., & Li, D. (2010). Aggression, social competence, and academic achievement in Chinese children: A 5-year longitudinal study. *Development Psychopathology*, 22(03), 583–592
- Dreman, S., & RonenEliav, H. (1997, May). The relation of divorced mothers' perceptions of family cohesion and adaptability to behavior problems in children. *Journal of Marriage and the Family*, 59(2), 324–331
- Elam, K. K., Chassin, L., & Pandika, D. (2018, Dec). Polygenic risk, family cohesion, and adolescent aggression in Mexican American and European American families: Developmental pathways to alcohol use. *Development and Psychopathology*, 30(5), 1715–1728
- Estevez, E., Jimenez, T. I., & Cava, M. J. (2016, Apr). A Cross-Cultural Study in Spain and Mexico on School Aggression in Adolescence: Examining the Role of Individual, Family, and School Variables. *Cross-Cultural Research*, 50(2), 123–153
- Fei, L., Shen, Q., Zheng, Y., Zhao, J., Jiang, S., Wang, L., & Wang, X. (1991). Preliminary evaluation of Chinese version of FACES II and FES: comparison of normal families and families of schizophrenic patients. *Chinese Mental Health Journal*, 5(5), 198–202
- Furlong, M. J., Gilman, R., & Huebner, E. S. (2014). *Handbook of positive psychology in schools* (2nd ed.). Routledge: Taylor & Francis
- Goodrum, N. M., Smith, D. W., Hanson, R. F., Moreland, A. D., Saunders, B. E., & Kilpatrick, D. G. (2020, Nov). Longitudinal Relations among Adolescent Risk Behavior, Family Cohesion, Violence Exposure, and Mental Health in a National Sample. *Journal of Abnormal Child Psychology*, 48(11), 1455–1469
- Gorman-Smith, D., Henry, D. B., & Tolan, P. H. (2004, Sep). Exposure to community violence and violence perpetration: the protective effects of family functioning. *Journal of Clinical Child and Adolescent Psychology*, 33(3), 439–449
- Hamama, L., & Arazi, Y. (2012, Aug). Aggressive behaviour in at-risk children: contribution of subjective well-being and family cohesion. *Child & Family Social Work*, 17(3), 284–295
- Henneberger, A. K., Durkee, M. I., Truong, N., Atkins, A., & Tolan, P. H. (2013, Nov). The longitudinal relationship between peer violence and popularity and delinquency in adolescent boys: examining effects by family functioning. *Journal of Youth and Adolescence*, 42(11), 1651–1660
- Hu, L., & Bentler, P. M. (1999, 01/01). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
- Hu, T., & Zhang, D. (2015). The relationship between psychological suzhi and depression of middle school students: The mediating role of self service attribution bias. *Journal of Southwest University(Social Sciences Edition)*, 41(6), 104–109
- Hu, T., Zhang, D., & Cheng, G. (2017). Revision of the brief psychological Suzhi questionnaire for adolescents: Studies of reliability and validity. *Journal of Southwest University (Social Science Edition)*, 43(2), 120–126
- Ivarsson, T., Broberg, A. G., Arvidsson, T., & Gillberg, C. (2005). Bullying in adolescence: psychiatric problems in victims and bullies as measured by the Youth Self Report (YSR) and the Depression Self-Rating Scale (DSRS). *Nordic Journal of Psychiatry*, 59(5), 365–373
- Jenkins, L. N., Demaray, M. K., & Tennant, J. (2017). Social, Emotional, and Cognitive Factors Associated With Bullying[J]. *School Psychology Review*, 46(1), 42–64
- Li, X., Phillips, M. R., Zhang, Y., Niu, Y., Tong, Y., & Yang, S. (2011). Development, reliability and validity of the Chinese version of Buss & Perry aggression questionnaire. *Chinese Journal of Nervous and Mental Diseases*, 37(10), 607–613
- Lin, W. H., & Yi, C. C. (2019, Jul). The Effect of Family Cohesion and Life Satisfaction During Adolescence on Later Adolescent Outcomes A Prospective Study. *Youth & Society*, 51(5), 680–706
- Liu, G., Zhang, D., Pan, Y., Ma, Y., & Lu, X. (2017). The Effect of Psychological Suzhi on Problem Behaviors in Chinese Adolescents: The Mediating Role of Subjective Social Status and Self-esteem. *Frontiers in psychology*, 8, 1490
- Liu, G. Z., Pan, Y. G., Li, B. B., Hou, X. L., & Zhang, D. J. (2019). The protective effect of psychological suzhi on the relationship between school climate and alcohol use among Chinese adolescents. *Psychology Research and Behavior Management*, 12, 307–315
- Lucia, V. C., & Breslau, N. (2006, Feb 28). Family cohesion and children's behavior problems: A longitudinal investigation. *Psychiatry Research*, 141(2), 141–149
- Marsiglia, F. F., Parsai, M., & Kulis, S. (2009, Jul-01). Effects of Familism and Family Cohesion on Problem Behaviors among Adolescents in Mexican Immigrant Families in the Southwest U.S. *Journal of ethnic & cultural diversity in social work*, 18(3), 203–220
- Miao, H., Guo, C., Wang, T., Li, Z., Zhang, Y., & Wang, Y. (2021). Social adaptation of left-behind children and its relationship with family cohesion during the COVID-19 epidemic: the mediating role of psychology suzhi. *Journal of Southwest University(Natural Science Edition)*, 43(01), 31–38
- Musci, R. J., Bradshaw, C. P., Maher, B., Uhl, G. R., & Ialongo, N. S. (2013). Reducing Aggression and Impulsivity Through School-Based Prevention Programs: A Gene by Intervention Interaction[J]. *Prevention Science the Official Journal of the Society for Prevention Research*, 15(6)
- Olson, D., Mccubbin, H., Barnes, H., Larsen, A., Muxen, M., & Wilson, M. (1982). *Family Inventories: Inventories Used in a National Survey of Families Across the Life Cycle*. Family Social Science, University of Minnesota
- Peng, X., Du, K., Yin, G., & Gui, T. (2020). Parental emotional warmth and children's positive and negative emotion: The continuous



- mediation of psychological suzhi and hope and their differences. *Journal of Southwest University*, 42(2), 22–28
- Peng, Z., Klomek, A. B., Li, L., Su, X., Sillanmäki, L., Chudal, R., & Sourander, A. (2019, Oct 28). Associations between Chinese adolescents subjected to traditional and cyber bullying and suicidal ideation, self-harm and suicide attempts. *BMC Psychiatry*, 19(1), 324
- Podsakoff, M., MacKenzie, P., & Jeong-Yeon. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903
- Reeb, B. T., Chan, S. Y. S., Conger, K. J., Martin, M. J., Hollis, N. D., Serido, J., & Russell, S. T. (2015, Oct). Prospective Effects of Family Cohesion on Alcohol-Related Problems in Adolescence: Similarities and Differences by Race/Ethnicity. *Journal of Youth and Adolescence*, 44(10), 1941–1953
- Ren, Z., Zhao, Z., Yu, X., Zhao, C., Zhang, L., Lin, Y., & Zhang, W. (2020). Testosterone and aggressive behavior in juvenile offenders with antisocial tendency: The mediation effect of hostile attention bias and the moderation effect of cortisol. *Acta Psychologica Sinica*, 52(11), 1288–1300
- Richmond, M. K., & Stocker, C. M. (2006, Dec). Associations between family cohesion and adolescent siblings' externalizing behavior. *Journal of Family Psychology*, 20(4), 663–669
- Rivera, F. I., Guarnaccia, P. J., Mulvaney-Day, N., Lin, J. Y., Torres, M., & Alegria, M. (2008). Family Cohesion and its Relationship to Psychological Distress among Latino Groups. *Hispanic Journal of Behavioral Sciences*, 30(3), 357–378
- Ryan, W., & Smith, J. D. (2009, Sep). Antibullying programs in schools: how effective are evaluation practices? *Prevention Science: The Official Journal of the Society for Prevention Research*, 10(3), 248–259
- Sourander, A., Jensen, P., Rönning, J. A., Elonheimo, H., Niemelä, S., Helenius, H. ... Almqvist, F. (2007, Jun). Childhood bullies and victims and their risk of criminality in late adolescence: the Finnish From a Boy to a Man study. *Archives of Pediatrics & Adolescent Medicine*, 161(6), 546–552
- Tolan, P. H., Gorman-Smith, D., Huesmann, L. R., & Zelli, A. (1997, Sep). Assessment of family relationship characteristics: A measure to explain risk for antisocial behavior and depression among urban youth. *Psychological Assessment*, 9(3), 212–223
- Undheim, A. M., & Sund, A. M. (2010, Nov). Prevalence of bullying and aggressive behavior and their relationship to mental health problems among 12- to 15-year-old Norwegian adolescents. *European Child & Adolescent Psychiatry*, 19(11), 803–811
- Wang, X., & Zhang, D. (2012). Looking beyond PTH and DFM: the relationship model between psychological suzhi and mental health. *Journal of Southwest University(Social Sciences Edition)*, 38(6), 67–74
- Withers, M. C., McWey, L. M., & Lucier-Greer, M. (2016, Dec). Parent-Adolescent Relationship Factors and Adolescent Outcomes Among High-Risk Families. *Family Relations*, 65(5), 661–672
- Works, D. M. (2015). *Teachers' Experiences and Perspectives Concerning the Rise in Student Aggression in Public Schools* [Ed.D., Walden University]. ProQuest Central. Ann Arbor
- Yabiku, S. T., Marsiglia, F. F., Kulis, S., Parsai, M. B., Becerra, D., & Del-Colle, M. (2010). Parental monitoring and changes in substance use among Latino/a and non-Latino/a preadolescents in the Southwest. *Substance Use & Misuse*, 45(14), 2524–2550
- Zhai, P., Hu, Y., & Liu, L. (2021). Parental Harsh Discipline and Children's Anxiety: The Mediating Role of Family Cohesion. *Studies of Psychology and Behavior*, 19(2), 201–208
- Zhang, D. (2003). On man's mental quality. *Studies of Psychology and Behavior*, 1(2), 143–146
- Zhang, D. (2009). Psychological suzhi and its structure. *Advance in Psychology Research*(70),239–250
- Zhang, D. (2012). Integrate Adolescents' Mental Health and Psychological Suzhi Cultivation. *Psychological Science*, 35(3), 530–536
- Zhang, D., Li, X., & Gong, L. (2013). Theoretical thinking in psychological suzhi and its formation mechanism – based on the perspective of cultural-history activity theory. *Journal of Southwest University(Social Sciences Edition)*, 39(2), 71–76
- Zhang, D., Wang, J., & Yu, L. (2011). *Methods and Implementation Strategies on Cultivating Children's Psychological Suzhi*. New York, NY: Nova Science
- Zhang, H. (2019). Emotion being the fundamental symbol of mental health: Discussion on the theory of eliminating emotions in mental health and psychological education activities. *Journal of Liaoning Normal University(Social Science Edition)*, 42(02), 58–62
- Zhang, J., & Zhang, D. (2019). The explicit and implicit correlation of college students' psychological suzhi level and the positive and negative emotions. *Studies of Psychology and Behavior*, 17(1), 91–96
- Zhang, T., & Wang, Z. (2020). The Effects of Family Functioning and Psychological Suzhi Between School Climate and Problem Behaviors. *Front Psychol*, 11, 212. <https://doi.org/10.3389/fpsyg.2020.00212>
- Zhao, Z., Zhang, D., Liu, G., Li, B., & Pan, Y. (2017). Family Cohesion and School Belonging in Primary School Students: The Chain Mediating Effect of Psychological Suzhi and Self-concept. *Chinese Journal of Clinical Psychology*, 25(06), 1143–1146
- Zhao, Z., Zhang, D., & Zhang, L. (2021). Relationship among bullying victimization, psychological traits and suicide ideation of middle school students in Bijie. *Chinese Journal of School Health*, 42(1), 83–86. <https://doi.org/10.16835/j.cnki.1000-9817.2021.01.020>
- Zinatmotlagh, F., Ataei, M., Jalilian, F., Mirzaeialavijeh, M., Aghaei, A., & Shirazi, K., K (2013). Predicting Aggression among Male Adolescents: an Application of the Theory of Planned Behavior. *Health Promot Perspect*, 3(2), 269–275

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.