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ORIGINAL RESEARCH

Body Image Dissatisfaction and Aggressive Behavior Among Chinese Children at Different Pubdertal Stages: A Path Analysis

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Background: Body image dissatisfaction and aggressive behavior have become important public health problem in children and adolescents, and body image dissatisfaction may increase the occurrence of aggressive behavior. The aim of this study was to explore the correlation between body image dissatisfaction and aggressive behavior among Chinese children in different developmental stages.

Methods: The stratified cluster sampling method was used to effectively survey 518 children aged 8–15 years. The Body Shape Questionnaire and the Buss-Warren Aggressive Questionnaire scale were used to measure body image dissatisfaction and aggressive behavior. Pubertal development stages were divided into three stages according to Tanner criteria.

Results: There was a main correlation path of body image dissatisfaction - hostility - anger - indirect aggression - physical aggression in boys with stage I and stage II and in girls with stage I and stage III. In addition, there were direct paths of hostility - indirect aggression, hostility - verbal aggression, anger - physical aggression, and anger - verbal aggression in boys with stage I; hostility - indirect aggression, hostility - verbal aggression, and anger - physical aggression in boys with stage II and in girls with stage I; and anger - physical aggression, and anger - verbal aggression in girls with stage III.

Conclusion: Body image dissatisfaction might positively correlate with aggression through hostility among Chinese children and adolescents, and their association paths were different in different puberty stages.

Keywords: aggressive behavior, body image dissatisfaction, puberty, children, adolescents

Background

Aggressive behavior is the intention to hurt or harm others and can occur through a variety of behaviors, including physical aggression (hitting and pushing), verbal aggression (teasing and name-calling), and indirect aggression (spreading rumors and social exclusion).[1–3] In recent years, aggressive behavior in children and adolescents has become an important public health problem worldwide.[4] Studies suggest that the incidence of aggressive behavior in children increased from 2% to 16% from 1994 to 2015, respectively.[5] The overall prevalence of physical aggression among adolescents was 35.6% (95% CI 30.7–40.5).[6] The generation of aggressive behavior is related to biological and environmental factors.[7] The hostility attribution theory suggests that aggressive behavior is considered to occur after the hostile attribution that the self is threatened, which has been widely accepted.[8,9] Hostility, anger and aggression are part of overt aggression, which is composed of emotion, cognition and behavior, and the factors that cause hostility and anger can lead to aggression.[10]

Body image dissatisfaction refers to a person's subjective dissatisfaction with the size or shape of his or her body, including body shape, sex, sexual organs, appearance and other aspects of dissatisfaction, it is a psychological symptom caused by the perception that one's own body deviates from the ideal body image and the disappointment of self-image.[11–13] Currently, body image dissatisfaction has become a public health problem[14] and is a common phenomenon among children and adolescents.[15] Approximately 70% of obese children wish to be thinner, while 57.0% and 66.7% of underweight boys and girls wish to be fatter, respectively.[16] At the same time, the level of body image dissatisfaction of children aged 8–12 years in Guangzhou is 78.10%, among which 65.54% of boys want to be fatter and 52.95% of girls want to be thinner.[17] The studies have found that

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adolescents with body image dissatisfaction will have more psychological, health problems such as low self-esteem, anxiety, depression.[18] Adolescents with such difficult emotions and more severe mood disorders may experience more severe aggression.[19] Therefore, it is speculated that body image dissatisfaction may be related to aggressive behavior. However, the correlation between body image dissatisfaction and aggressive behavior has rarely been reported.

Adolescence is a period of rapid physical development and gradual cognitive improvement, and social influence has become more important than before.[20] Body image dissatisfaction of boys in early adolescence increases throughout the assessment period, and the emphasis on body appearance may become greater in late adolescence than in early adolescence,[21] while that of girls in adolescence first appears in early adolescence and decreases in middle and late adolescence.[22] Some researchers have also pointed out that the occurrence of children's aggressive behavior is regular, and the kind of aggressive behavior depends on a person's developmental stage.[23] Studies have shown that the average level of physical aggression in boys decreases during the development of youth in late adolescence and may be gradually replaced by verbal and indirect aggression.[24] Girls, on the other hand, tend to avoid physical aggression and choose indirect aggression.[25] Therefore, the correlation between body image dissatisfaction and aggressive behavior may be different at different pubertal stages due to the different psychological, intellectual and emotional regulation of adolescents. The purpose of this study was to explore the relationship between body image dissatisfaction and aggressive behavior among Chinese children in different pubertal stages.

Methods

Participants

The stratified cluster random sampling method was used (stratified by grade, with the class as the whole group) to select participants from 2 nine-year schools. A total of 518 effective students aged 8–15 years were selected, including 275 boys (53.09%) and 243 girls (46.91%). The students' guardians all signed informed consent forms before the questionnaire survey in this study. This study was approved by the Ethics Committee of Bengbu Medical College ([2015] NO.003) and was conducted in accordance with the Declaration of Helsinki.

Aggressive Behavior Measurement

Aggressive behavior was measured by the Buss-Warren Aggressive Questionnaire (BWAQ edition 2000).[26] The scale contains 30 items and measures children's aggressive behavior in five dimensions: physical aggression, verbal aggression, anger, hostility and indirect aggression. Each item is scored on a 5-point Likert scale. The participants made the appropriate choice according to the actual situation (1 = "not at all like me", 2 = "a little like me", 3 = "sort of like me", 4 = "a lot like me", and 5 = "almost like me"). The higher the score was the stronger the aggressive behavior. The overall Cronbach's coefficient of this scale was 0.93 while Cronbach's coefficient of the physical aggression subscale was 0.84, Cronbach's coefficient of the hostility subscale was 0.79, Cronbach's coefficient of the anger subscale was 0.77, Cronbach's coefficient of the indirect aggression subscale was 0.66, and Cronbach's coefficient of the verbal aggression subscale was 0.65.

Body Image Dissatisfaction Measurement

Body image dissatisfaction was measured using the Body Shape Questionnaire (BSQ).[27] Each item is scored on a 5-point Likert scale as follows: 1 = "never", 2 = "little", 3 = "sometimes", 4 = "often", 5 = "very often", and 6 = "always". The total scores range from 14 to 84. Higher scores indicate more severe body image dissatisfaction. Cronbach's coefficient of this scale was 0.94.

Puberty Development Stages

The secondary sexual characteristics and development of external genitalia were examined by medical staff who received standardized training. In boys, testicular volume was measured using a Prader testicular volume meter and they were asked whether first spermatorrhea had occurred (yes or no). Girls were checked for breast development based on the Tanner stages[28] and asked whether menarche had occurred (yes or no). According to secondary development and first spermatorrhea or menarche, pubertal development was divided into the following three stages: stage I (girls: breast

development < Tanner stage II; boys: testicular volume < 4 mL), stage II (girls: breast development ≥ Tanner stage II and no menarche; boys: testicular volume ≥ 4 mL, and no first spermatorrhea), and stage III (girls: after menarche; boys: after first spermatorrhea).

Data Analysis

SPSS 23.0 software was used for statistical analysis. The quantitative data are described as the mean ($\bar{x}$) ± SD. The comparisons of differences in the aggressive behavior scores and body image dissatisfaction scores between the sexes were analyzed using *t*-tests, and those at different developmental stages were analyzed using one-way ANOVA (comparisons of two groups using the LSD *t*-test). Pearson correlation was used to analyze associations between aggressive behavior and body image dissatisfaction. Furthermore, the stepwise multiple linear regression model was used to analyze associations between aggressive behavior and body image dissatisfaction after adjusting for age. AMOS 24.0 software was used to build a structural equation model. If the validation indices were *P*-value > 0.05, RMSEA (Root mean square error of approximation) < 0.08, SRMR (Standardized root mean square residual) < 0.08, and GFI (Goodness-of-fit index), CFI (Comparative fit index) and IFI (Incremental fix index) closer to 1, the model fitting was considered good.[1] Indirect effect tests were conducted using a bootstrap approach, computing 5000 bootstrap resamples with replacement to generate 95% bias-corrected confidence intervals (BC 95% CI) for the indirect effects. $P < 0.05$ was statistically significant.

Results

A total of 275 boys (137 boys in stage I, 100 boys in stage II, and 38 boys in stage III) and 243 girls (60 girls in stage I, 78 girls in stage II, and 105 girls in stage III) were enrolled in this study. The results showed that there were no significant differences in the physical aggression score (PAS), anger aggression score (AAS), verbal aggression score (VAS), indirect aggression score (IAS), hostility aggression score (HAS), or body shape questionnaire score (BSQS) between the boys and girls ($P > 0.05$); (see Table 1 for details). The results also showed that there were no significant differences in the PAS, AAS, VAS, IAS, HAS among girls and boys in different developmental stages ($P > 0.05$). However, the BSQS was lower in boys in stage III than in boys in stage I ($P < 0.05$) (see Table 2 for details).

Association Between Body Image Dissatisfaction and Aggressive Behavior

The Pearson correlation results showed that the BSQS was positively associated with the AAS, VAS, IAS, and HAS in boys in stage I ($P < 0.01$). In boys in stage II, the BSQS was positively related to the PAS, AAS, VAS and HAS ($P < 0.05$). There were also significantly positive correlations between the BSQS and HAS in girls in stage I and stage III ($P< 0.01$). In addition, the PAS, AAS, VAS, IAS and HAS were significantly correlated with each other among boys in stage I and stage II and among girls in different developmental stages ($P< 0.05$); however, there were no significant associations between the PAS and VAS, the IAS and VAS, or the IAS and HAS in boys in stage III ($P > 0.05$) (see Figure 1 for details).

Table 1 Comparisons of Aggressive Behavior Score and BSQ Score Between Gender ($\bar{x}$±SD)

Variables	Boys (n=275)	Girls (n=243)	*t* value	*P* value
Physical aggression score	12.5±5.8	12.0±5.6	1.10	0.274
Anger aggression score	11.6±4.9	12.0±5.2	−0.89	0.373
Verbal aggression score	10.9±4.0	11.1±4.1	−0.52	0.601
Indirect aggression score	9.5±4.1	9.9±4.1	−1.09	0.278
Hostility aggression score	13.3±5.6	13.6±5.7	−0.59	0.554
Body shape questionnaire score	24.1±12.5	26.0±13.1	−1.68	0.095

Table 2 Comparisons of Aggressive Behavior Score and BSQ Score Among Children and Adolescents with Different Pubertal Development Stages ($\bar{x}$±SD)

Variables	Pubertal Development Stages			*F* value	*P* value
	Stage I	Stage II	Stage III		
Boys					
Physical aggression score	12.1±6.2	12.7±5.6	13.3±5.0	1.18	0.310
Anger aggression score	11.3±5.3	12.1±4.6	11.4±4.0	0.67	0.512
Verbal aggression score	10.3±4.4	11.5±3.6	11.7±3.2	0.01	0.993
Indirect aggression score	8.9±4.2	10.2±4.1	9.7±3.4	0.87	0.421
Hostility aggression score	12.8±5.9	13.8±5.3	13.7±5.2	0.06	0.946
Body shape questionnaire score	25.8±14.5	23.0±10.3	21.1±9.3[a]	3.55	0.030
Girls					
Physical aggression score	12.4±6.4	12.3±5.8	11.5±4.9	0.48	0.621
Anger aggression score	11.6±5.3	11.9±5.4	12.2±4.9	0.01	0.988
Verbal aggression score	10.3±4.9	11.1±4.2	11.6±3.3	0.30	0.738
Indirect aggression score	9.8±4.8	9.5±4.3	10.2±3.4	0.60	0.551
Hostility aggression score	13.4±6.3	13.3±6.1	13.9±5.0	0.47	0.623
Body shape questionnaire score	24.9±12.3	26.2±15.3	26.5±11.7	0.33	0.719

Note: [a]Compared with stage I, the difference was significant. $P < 0.05$.

Preliminary Model of Association Between Body Image Dissatisfaction and Aggressive Behavior

Aggressive behavior theory holds that anger and hostility are mediating variables of physical aggression, verbal aggression and indirect aggression. Based on the aggressive behavior theory and the results of associations between the BSQS and aggression behavior score, multiple linear regression models were constructed to develop preliminary models of associations between body image dissatisfaction and aggressive behaviors after adjusting for age.

The results showed that the HAS significantly predicted the AAS in boys and girls at different developmental stages. The BSQS significantly predicted the HAS in boys in stage I and stage II, and in girls in stage I and stage III. The AAS and HAS significantly predicted the IAS, VAS, and PAS in boys in stage I. In boys in stage II, the AAS and HAS significantly predicted the IAS; however, only the AAS predicted the PAS, and the HAS only predicted the VAS. In boys in stage III, only the AAS predicted the IAS, the HAS predicted the PAS, and the AAS predicted the VAS.

In girls in stage I, the AAS and HAS significantly predicted the IAS; however, only the AAS predicted the PAS, and the HAS predicted the VAS. In girls in stage II, the AAS and HAS significantly predicted the IAS; however, only the AAS predicted the PAS and VAS. The AAS significantly predicted the IAS, PAS, and VAS in girls in stage III. The specific results are shown in Table 3. According to the results of stepwise multiple linear regression, the preliminary model paths of the associations between body image dissatisfaction and aggressive behaviors are shown in Figure 2.

Model Fitting of Associations Between Body Image Dissatisfaction and Aggressive Behavior

We fitted preliminary model paths of the associations between body image dissatisfaction and aggressive behaviors in boys and girls at different development stages using structural equation model, but all *P*-values < 0.05 and RMSEA

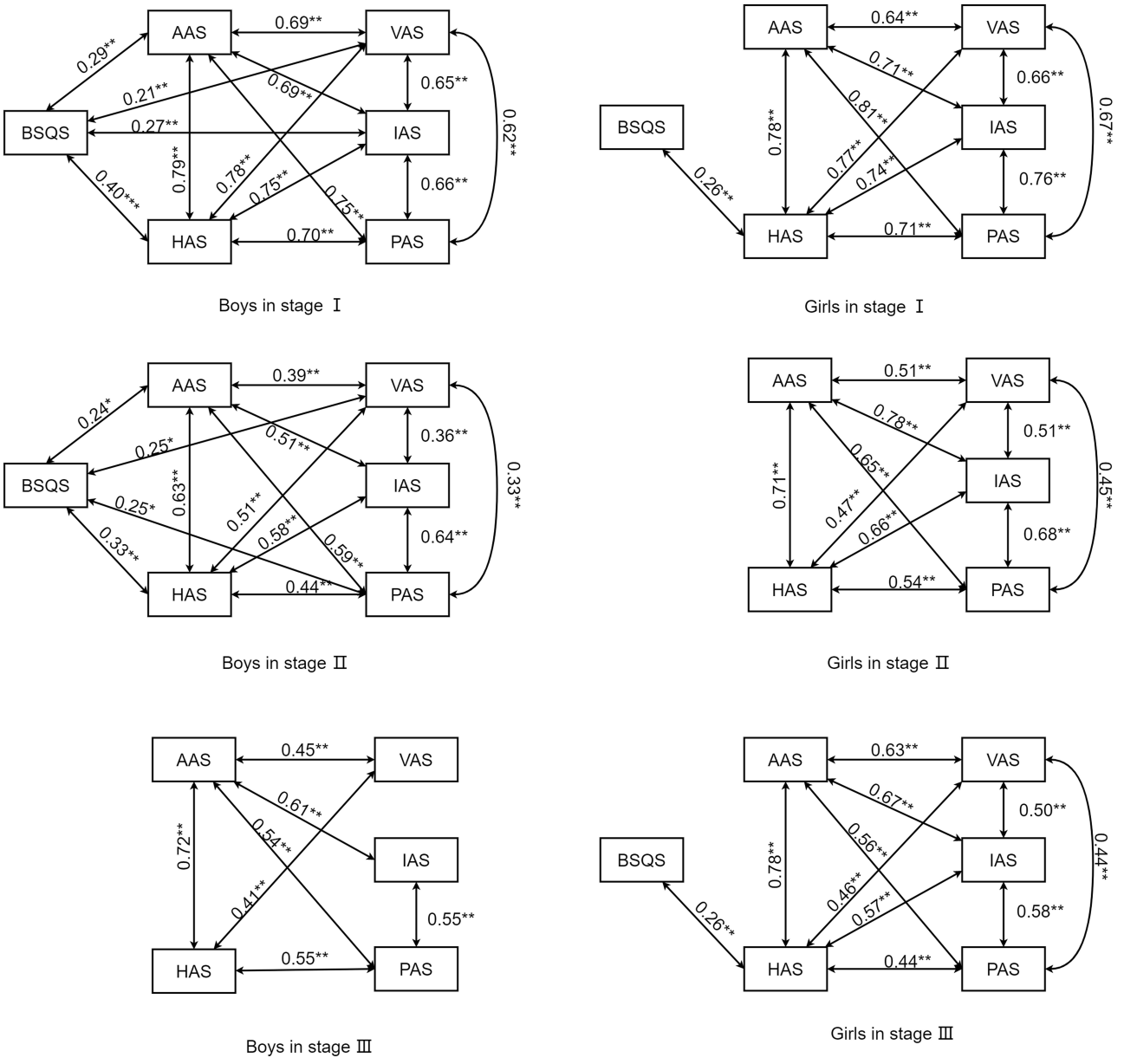

Figure 1 Associations between aggressive behavior and body image dissatisfaction using Pearson correlation.
Note: *P < 0.05, **P < 0.01, ***P < 0.001.
Abbreviations: BSQS, body shape questionnaire score; AAS, anger aggression score; HAS, hostility aggression score; VAS, verbal aggression score; IAS, indirect aggression score; PAS, physical aggression score.

values > 0.08. According to the criteria of the model fitting index, the model fitting of these preliminary model paths needs to be improved. Based on the MI model revision index and theoretical framework considerations, we added paths from HAS to PAS and from IAS to PAS in boys in stage I, from IAS to PAS in boys in stage II, stage III and in girls in stage I, stage II, stage III. According to the criteria of the model fitting index, the revised models had good fitting effects. The model fitting indicators are shown in Table 4. The standard direct path coefficients of the revised model are shown in Figure 3, and the standard indirect path coefficients are shown in Table 5.

Discussion

There is a certain correlation between body image dissatisfaction and aggressive behavior in Chinese children and adolescents. Body image dissatisfaction can trigger aggressive behavior in adolescents through hostility, and the

Table 3 Associations Between Body Image Dissatisfaction and Aggressive Behaviors Using Multiple Linear Regression Models

Dependent Variable	Independent Variable	β	S.E.	*t* value	*P* value	95% CI	
						LLCI	ULCI
Boys in stage I							
AAS	HAS	0.79	0.05	15.00	<0.001	0.67	0.88
HAS	BSQS	0.40	0.08	5.12	<0.001	0.24	0.53
IAS	HAS	0.56	0.09	6.20	<0.001	0.37	0.72
	AAS	0.25	0.09	2.71	0.008	0.07	0.42
PAS	HAS	0.27	0.09	3.00	0.003	0.09	0.44
	AAS	0.54	0.09	5.95	<0.001	0.36	0.72
VAS	HAS	0.62	0.09	7.03	<0.001	0.45	0.81
	AAS	0.20	0.09	2.32	0.022	0.03	0.39
Boys in stage II							
AAS	HAS	0.63	0.08	7.93	<0.001	0.46	0.77
HAS	BSQS	0.33	0.11	3.40	0.001	0.16	0.61
IAS	HAS	0.42	0.11	4.06	<0.001	0.23	0.68
	AAS	0.25	0.11	2.41	0.018	0.05	0.50
PAS	AAS	0.59	0.09	7.18	<0.001	0.46	0.80
VAS	HAS	0.51	0.08	5.82	<0.001	0.33	0.68
Boys in stage III							
AAS	HAS	0.72	0.09	6.20	<0.001	0.39	0.76
VAS	AAS	0.44	0.17	2.98	0.005	0.17	0.87
IAS	AAS	0.61	0.14	4.56	<0.001	0.36	0.94
PAS	HAS	0.55	0.13	3.95	<0.001	0.25	0.77
Girls in stage I							
HAS	BSQS	0.26	0.13	2.03	0.047	0.00	0.53
AAS	HAS	0.78	0.08	9.44	<0.001	0.56	0.89
IAS	HAS	0.47	0.13	3.54	0.001	0.20	0.73
	AAS	0.35	0.14	2.58	0.013	0.08	0.64
PAS	AAS	0.81	0.08	10.39	<0.001	0.66	0.98
VAS	HAS	0.77	0.09	9.27	<0.001	0.62	0.97
Girls in stage II							
AAS	HAS	0.71	0.08	8.82	<0.001	0.56	0.88
VAS	AAS	0.51	0.09	5.17	<0.001	0.29	0.65

(*Continued*)

Table 3 (Continued).

Dependent Variable	Independent Variable	β	S.E.	t value	*P* value	95% CI	
						LLCI	ULCI
IAS	AAS	0.63	0.10	6.36	<0.001	0.44	0.83
	HAS	0.21	0.10	2.08	0.041	0.01	0.41
PAS	AAS	0.65	0.08	7.39	<0.001	0.44	0.77
Girls in stage III							
HAS	BSQS	0.28	0.09	2.98	0.004	0.09	0.44
AAS	HAS	0.78	0.07	12.49	<0.001	0.73	1.00
IAS	AAS	0.67	0.07	9.03	<0.001	0.46	0.72
PAS	AAS	0.56	0.08	6.92	<0.001	0.37	0.67
VAS	AAS	0.63	0.07	8.14	<0.001	0.43	0.71

Abbreviations: BSQS, Body shape questionnaire score; AAS, Anger aggression score; HAS, Hostility aggression score; VAS, Verbal aggression score; IAS, Indirect aggression score; PAS, Physical aggression score; S.E., standard error; 95% CI, 95% confidence intervals; LLCI, lower limit of 95% CI; ULCI, upper limit of 95% CI.

relationship between body image dissatisfaction and aggressive behavior is affected by developmental stage and sex. There was a main correlation path of body image dissatisfaction - hostility - anger - indirect aggression - physical aggression in boys in stage I and stage II and in girls in stage I and stage III.

The results of this study showed that there were no significant differences in the HAS, AAS, PAS, IAS, or VAS between boys and girls among children in stage I, stage II and stage III. Previous studies showed that boys tended to have more physical aggression, and girls used more indirect aggression.[25] However, previous studies also reported that the differences in verbal aggression, hostility and anger were not significant between boys and girls.[25,29] This study did not find differences in aggressive behavior among children in different developmental stages, which may be related to the narrow age range of the participants (8–15 years old).

The results of this study showed that there was no significant difference in BSQS between boys and girls, however, the BSQS in boys with stage III was lower than that in boys with stage I. Our previous studies based on the same participants showed that there were no significant difference in body shape dissatisfaction score between girls and boys, were significant differences in gender dissatisfaction score, sexual organ dissatisfaction score in different puberty stages,[13] which may be because of the different scales (Teenage body image annoyance questionnaire (TBIAQ) and Body Shape Questionnaire (BSQ)) used for body image dissatisfaction. This is consistent with other previous findings that body image dissatisfaction tends to decline with advancing puberty in boys but not in girls.[30,31]

Pearson correlation and multiple linear regression results showed that BSQS was significantly positively correlated with the scores of aggressive behaviors such as AAS and HAS, suggesting that there may be a pathway from BSQS to HAS, AAS and other aggressive behaviors. However, the path model of body image dissatisfaction leading to aggressive behavior was different among boys and girls in different stages.

In boys in stage I, there was a main correlation path of body image dissatisfaction - hostility - anger - indirect aggression - physical aggression. Puberty in boys with a testicular volume < 4 mL (stage I) had not yet started. In this stage, the factors affecting body image are reflected more in the influence of peers (such as teasing by peers due to their own body shape and other factors).[32] Their ability to control emotions is still weak but is characterized by strong aggression.[1] Therefore, the BSQS will enhance the HAS and AAS and then enhance the IAS, PAS and VAS. In addition, studies have found a link between physical aggression and hostile attribution bias against physical provocation.[9] This could be one of the ways physical aggression increases hostility.

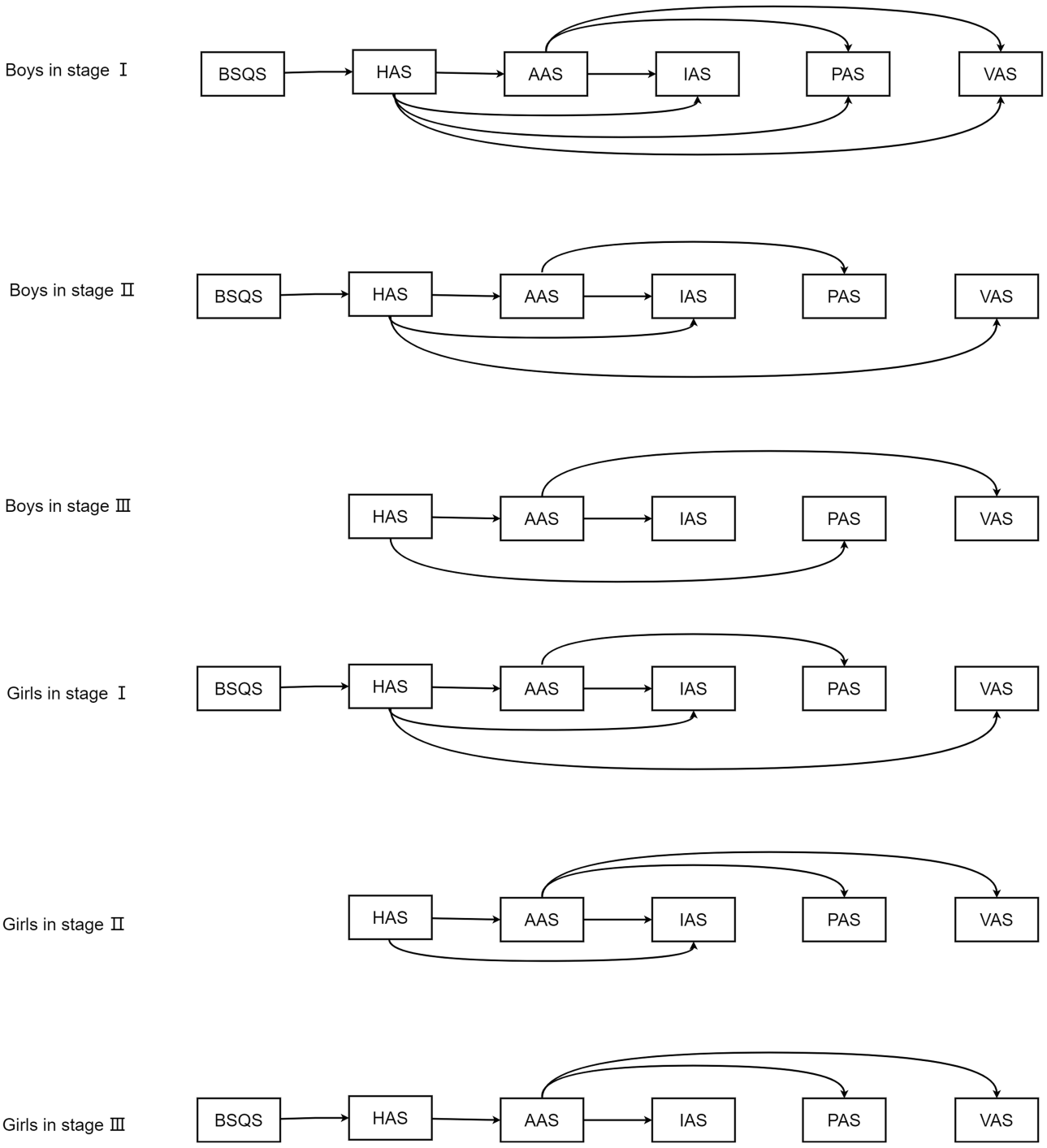

Figure 2 Preliminary models paths of associations between body image dissatisfaction and aggressive behaviors.
Abbreviations: BSQS, body shape questionnaire score; AAS, anger aggression score; HAS, hostility aggression score; VAS, verbal aggression score; IAS, indirect aggression score; PAS, physical aggression score.

As boys reach stage II of puberty, the direct paths from the AAS to the VAS and from the PAS to the HAS were not statistically significant in boys in stage II. In stage III, the path model from body image dissatisfaction to aggressive behavior was further simplified, and the paths from the BSQS to the HAS were not statistically significant. Boys' transitions to stage II shows that puberty has started, and their thinking and generalization abilities and emotional regulation abilities gradually improve.[12] Studies have reported that good emotional regulation could help reduce the

Table 4 Path Model Fitting Indexes for Associations Between Body Image Dissatisfaction and Aggressive Behaviors

Models	χ^2	DF	χ^2/DF	IFI	CFI	GFI	SRMR	RMSEA	*P* value
Preliminary model									
Boys in stage I	21.300	7	3.046	0.972	0.975	0.949	0.047	0.123	0.003
Boys in stage II	34.560	9	3.840	0.883	0.880	0.912	0.086	0.169	0.000
Boys in stage III	13.400	6	2.236	0.898	0.892	0.874	0.099	0.183	0.037
Girls in stage I	22.800	9	2.537	0.943	0.941	0.895	0.079	0.161	0.007
Girls in stage II	16.995	5	3.399	0.942	0.941	0.916	0.071	0.177	0.005
Girls in stage III	21.458	10	2.146	0.957	0.956	0.933	0.069	0.105	0.018
Adjusted model									
Boys in stage I	6.040	6	1.466	1.000	1.000	0.985	0.031	0.007	0.419
Boys in stage II	9.630	8	1.204	0.993	0.992	0.970	0.042	0.045	0.292
Boys in stage III	3.500	5	0.701	1.000	1.000	0.964	0.046	0.000	0.623
Girls in stage I	10.600	8	1.329	0.989	0.989	0.951	0.062	0.075	0.223
Girls in stage II	3.600	3	1.211	0.997	0.997	0.982	0.037	0.052	0.304
Girls in stage III	9.097	9	1.011	1.000	1.000	0.971	0.052	0.010	0.428

Abbreviations: χ^2, Chi-square; DF, Degrees of Freedom; χ^2/DF, Relative chi-square; IFI, Incremental fix index; CFI, Comparative fit index; GFI, Goodness of fit index; RMSEA, Root mean square error of approximation; SRMR, Standardized root mean square residual.

impact of anger on aggressive behavior.[1] It may also be that the improvement of boys' abilities to control emotions in stage II leads to the change of the direct effects from the AAS to the VAS and the direct path from the PAS to the HAS.

Boys' transitions to stage III shows that boys' sexual organs have developed to the adult level. In middle and late adolescence, adolescents' abilities to cope with emotions is enhanced, and they can better manage and express emotions.[33] Therefore, in this stage, there was no correlation between body image dissatisfaction and aggressive behavior.

The path model from body image dissatisfaction to aggressive behaviors in girls in stage I was consistent with that in boys in stage II. Girls with breast development < Tanner stage II (stage I) have yet not started puberty, and their secondary sexual characteristics have not developed. Girls in stage I are less influenced by their peers than boys.[34] Previous studies have found that girls between the ages of 9 and 12 years are better at controlling their emotions than boys.[35,36] which may be the reason why girls in stage I and boys in stage II have the same path model of association between body image dissatisfaction and aggressive behavior.

The relationship between body image dissatisfaction and aggressive behavior in girls in stage II was not statistically significant, which is similar to that in boys in stage III. Girls with breast development ≥ Tanner stage II and no menarche begin to start puberty. At this stage, the breasts of the girls begin to develop, the ratio of fat to muscle increases, and fat deposits on the breasts and buttocks. These changes in body appearance and body shape have important effects on self-cognition, body image, and psychosocial adaptation.[37] In addition, body image dissatisfaction is internalized and transformed into pressure on oneself, such as eating disorders,[38] low self-esteem, and depression.[39,40] Perhaps for this reason, body image dissatisfaction was not significantly associated with aggressive behavior in girls in stage II.

For girls who have experienced menarche (stage III), their sexual organs have reached the adult level. girls pay more attention to their body shape, are influenced by their peers and the media,[41,42] and show more emotion.[10] Due to social and other factors, this kind of dissatisfaction is externalized and exhibited in late-adolescent girls.[41,43] Thus, body image dissatisfaction plays a positive role in the occurrence of aggressive behavior in girls in stage III.

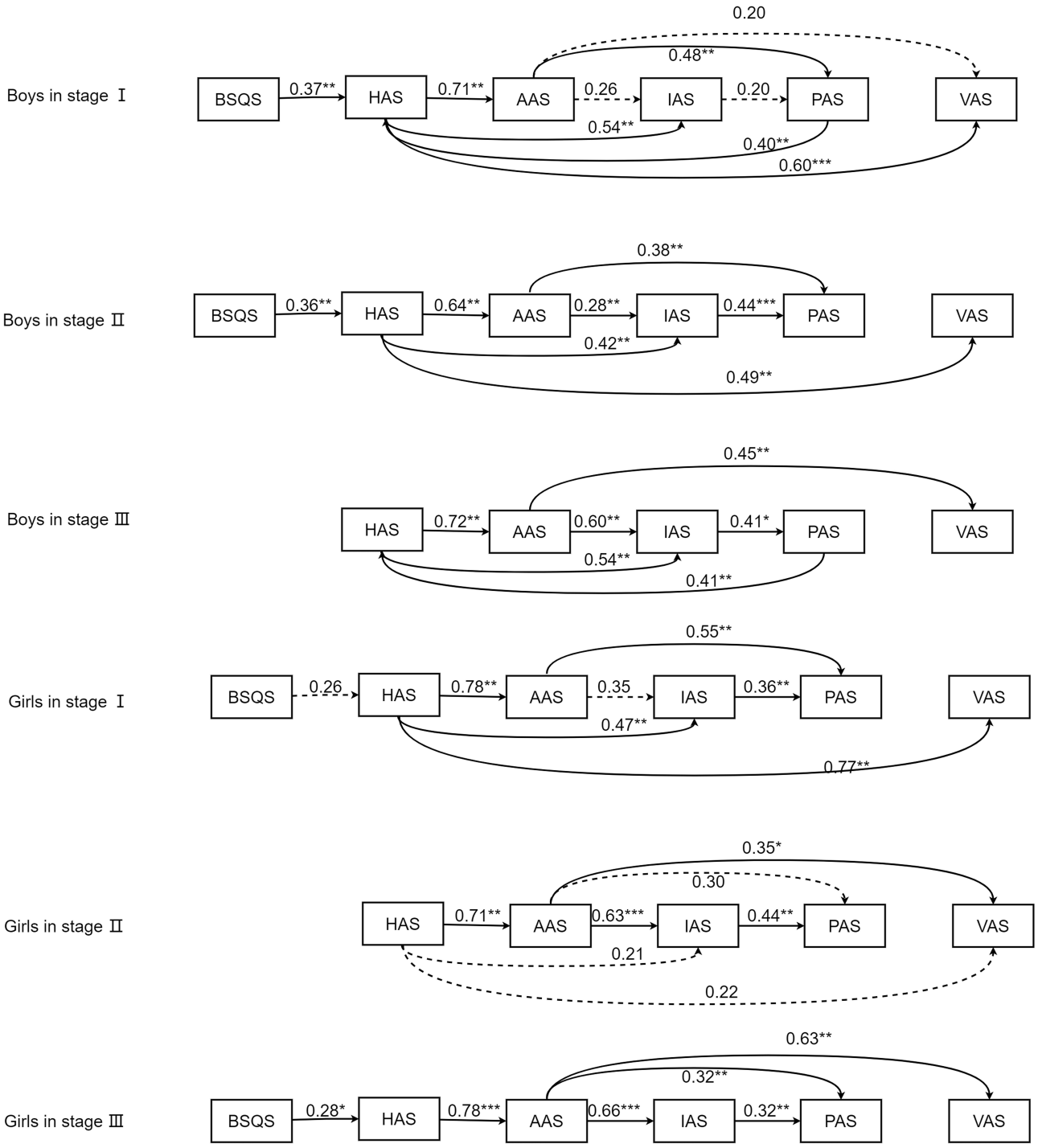

Figure 3 Model paths of associations between body image dissatisfaction and aggressive behaviors in boys and girls.
Notes: The solid line indicates that the standard direct effect was significant, and the dashed line indicates that the standard direct effect between the two was not significant. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.
Abbreviations: BSQS, body shape questionnaire score; AAS, anger aggression score; HAS, hostility aggression score; VAS, verbal aggression score; IAS, indirect aggression score; PAS, physical aggression score.

Practical Implications

There were the following practical implications. This study showed that body image dissatisfaction can trigger indirect aggressive behavior and physical aggressive behavior through hostility and anger in children and adolescents, especially in children before puberty. We should pay attention to the role of body image dissatisfaction in aggressive behavior;

Table 5 Model Indirect Path Coefficients for the Associations Between Body Image Dissatisfaction and Aggressive Behaviors

Effects	β	S.E.	*P* value	BC 95% CI	
				LLCI	ULCI
Standard indirect effect in boys in stage I					
BSQS➔ HAS ➔ AAS ➔ VAS	0.05	0.03	0.042	0.00	0.13
BSQS ➔ HAS ➔ VAS	0.22	0.05	<0.001	0.13	0.34
BSQS ➔ HAS ➔ IAS ➔ PAS ➔ HAS ➔ AAS ➔ VAS	0.00	0.00	0.029	0.00	0.01
BSQS➔HAS➔IAS➔PAS➔HAS➔VAS	0.01	0.01	0.026	0.00	0.03
Standard indirect effect in boys in stage II					
BSQS➔ HAS ➔VAS	0.18	0.07	0.003	0.05	0.33
BSQS➔ HAS ➔ AAS ➔PAS	0.09	0.04	0.003	0.03	0.18
BSQS➔HAS➔IAS➔PAS	0.07	0.03	0.001	0.02	0.15
BSQS➔ HAS ➔ AAS ➔IAS➔ PAS	0.03	0.02	0.003	0.01	0.08
Standard indirect effect in boys in stage III					
HAS➔AAS ➔VAS	0.32	0.09	0.001	0.13	0.50
HAS➔AAS➔IAS➔PAS	0.18	0.08	0.010	0.05	0.36
Standard indirect effect in girls in stage I					
BSQS➔ HAS ➔VAS	0.20	0.13	0.120	−0.04	0.45
BSQS➔ HAS ➔ AAS ➔PAS	0.11	0.07	0.064	−0.01	0.26
BSQS➔HAS➔IAS➔PAS	0.04	0.03	0.059	0.00	0.14
BSQS➔ HAS ➔ AAS ➔IAS➔ PAS	0.03	0.03	0.097	0.00	0.13
Standard indirect effect in girls in stage II					
HAS➔AAS➔VAS	0.25	0.09	0.012	0.07	0.43
HAS➔AAS➔PAS	0.21	0.12	0.079	−0.02	0.44
HAS➔AAS➔IAS➔PAS	0.20	0.08	0.001	0.08	0.42
HAS➔IAS➔PAS	0.09	0.07	0.082	−0.01	0.28
Standard indirect effect in girls in stage III					
BSQS➔ HAS ➔ AAS ➔VAS	0.14	0.06	0.019	0.02	0.25
BSQS➔ HAS ➔ AAS ➔PAS	0.07	0.04	0.014	0.01	0.17
BSQS➔ HAS ➔ AAS ➔IAS➔PAS	0.05	0.03	0.010	0.01	0.12

Abbreviations: BSQS, Body shape questionnaire score; AAS, Anger aggression score; HAS, Hostility aggression score; VAS, Verbal aggression score; IAS, Indirect aggression score; PAS, Physical aggression score; S.E., standard error; BC 95% CI, 95% bias-corrected confidence intervals; LLCI, lower limit of 95% CI; ULCI, upper limit of 95% CI.

Strengthen the screening of children and adolescents with body image dissatisfaction; Guide them to correctly understand their own body shape and development of secondary sexual characteristics; Prevent the occurrence of body image dissatisfaction from the factors of peer comparison, peer relationship, social media and other aspects. At the same time,

we should find out hostility and anger aggression caused by body image dissatisfaction as early as possible, and timely intervene to avoid further development into physical and indirect aggression.

Limitations

There were some limitations in this study. Firstly, the cross-sectional study was weak in causal inference. Secondly, this study did not adjust for other factors that may be related to aggressive behavior. Thirdly, the association path between body image dissatisfaction and aggressive behavior was only a theoretical model, which needs to be confirmed by confirmatory research. Finally, this study was limited to Chinese children and adolescents. In addition, the questionnaire used in this study was a self-reported questionnaire.

Conclusion

Body image dissatisfaction might positively correlate with aggression through hostility among Chinese children and adolescents, and their association paths were different in different puberty stages. It is very important to reduce occurrence of aggressive behaviors by changing the perceptions of adolescents with poor body image.

Abbreviations

BID, Body image dissatisfaction; BSQS, Body shape questionnaire score; AAS, Anger aggression score; HAS, Hostility aggression score; VAS, Verbal aggression score; IAS, Indirect aggression score; PAS, Physical aggression score; χ^2, Chi-square; DF, Degrees of Freedom; χ^2/DF, Relative chi-square; CFI, Comparative fit index; RMSEA, Root mean square error of approximation; SRMR, Standardized root mean square residual; GFI, Goodness-of-fit index; CFI, Comparative fit index; IFI, Incremental fix index; S.E., standard error; BC 95% CI, 95% bias-corrected confidence intervals; LLCI, lower limit of 95% CI; ULCI, upper limit of 95% CI.

Data Sharing Statement

All data generated or analyzed during this study are not publicly available to maintain the privacy of the individuals' identities. The dataset supporting the conclusions is available upon request to the corresponding author.

Ethics Approval and Consent to Participate

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Medical Research Ethics Committee of Bengbu Medical College ([2015] NO.003). Written informed consent was obtained from the parents.

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Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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