Association Between Schizoid and Aggressive Behaviors in Chinese Adolescents and the Mediating Influences of Childhood Trauma and Adverse Life Events

Tingyu Yang

Second Xiangya Hospital Department of Psychiatry: Second Xiangya Hospital Mental Health Institute

Yuqiong He

Second Xiangya Hospital Department of Psychiatry: Second Xiangya Hospital Mental Health Institute

Shuxian Wu

Second Xiangya Hospital Department of Psychiatry: Second Xiangya Hospital Mental Health Institute

Xuerong Luo (✉ luoxuerong@csu.edu.cn)

Second Xiangya Hospital Department of Psychiatry: Second Xiangya Hospital Mental Health Institute <https://orcid.org/0000-0003-2840-582X>

Jianbo Liu

Shenzhen Kangning Hospital

Primary research

Keywords: adolescent, adverse life events, aggressive behaviors, childhood trauma, schizoid

Posted Date: August 3rd, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-754312/v1>

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Abstract

Background: This study investigated an association between schizoid and aggressive behaviors in Chinese adolescents, and the influences of childhood trauma and adverse life events on this association.

Methods: The cross-sectional data of 3094 adolescents aged 12 to 16 years was collected from an epidemiological survey of child and adolescent mental disorders in Hunan Province, China. All these subjects completed the Achenbach's Child Behavior Checklist, the Childhood Trauma Questionnaire-Short Form, and the Adolescent Self-rating Life Event Checklist. Use independent-sample t-test, Pearson's correlation analysis, linear regression, mediation analysis and moderation analysis for data analysis.

Results: The regression analysis showed that schizoid ($\beta_{\text{male}} = 0.618$, $\beta_{\text{female}} = 0.637$, both $P < 0.001$) and adverse life events ($\beta_{\text{male}} = 0.113$, $\beta_{\text{female}} = 0.057$, all $P < 0.01$) predicted aggressive behaviors. In addition, childhood trauma predicted aggressive behaviors (female: emotional abuse and sexual abuse ($\beta = 0.118$ and -0.062 , both $P < 0.01$). Adverse Life events mediated the association between schizoid and aggressive behaviors in male and female adolescents. Emotional neglect in boys, and emotional abuse and sexual abuse in girls mediated the association. Only in female adolescents, the interaction between childhood trauma and life events affected the association between schizoid and aggressive behaviors ($P = 0.023$).

Conclusions: Schizoid are associated with aggressive behaviors in Chinese adolescents. Life events and childhood trauma mediated the association between schizoid and aggressive behaviors, and the interaction between childhood trauma and life events affected girls' aggressive behaviors. Hence, reducing childhood trauma and adverse life events can reduce the risk of aggressive behaviors in adolescents.

1 Background

Schizophrenia is a psychotic disorder characterized by hallucinations, delusions, and cognitive deficits, accompanied by impaired executive functions, memory, and speed of mental processing[1]. The prevalence rate of schizophrenia is high (0.28%), with 13.4 million disabled worldwide in 2016[2]. The aggressive behaviors of affected individuals have been linked to the crime rate[3]. A meta-analysis reported that 33.3% of patients with schizophrenia display aggression[4]. Other studies reported a 26.6% rate of behavioral aggression among patients with schizophrenia[5], a rate that is higher than that of Chinese adolescents by 3.2%[6]. The underlying mechanism of overly aggressive behaviors in schizophrenia and its prevention are issues of clinical concern. Because schizoid traits often predict higher risk of developing schizophrenia[7], and patients with schizophrenia are often not cooperative, understanding schizoid and aggressive behavior in the general population may be helpful to guide clinical practice.

According to Johns et al.[8], psychotic symptoms exist on a continuum with normal experience in the general population. Schizotypy which share similar manifestations with schizophrenia may be used to predict the development of psychotic-like symptoms[9, 10]. Schizotypy, as well as confirmed schizophrenia, have been linked to aggressive behavior. For example, Orjiakor et al.[11] found that schizotypal traits such as impulsive non-conformity were associated with physical and socially aggressive behavior in young adults. Several studies also indicated that schizotypy was independently associated with increased reactive aggression in children and adolescents[12-14]. Wolff and Chick[15] reported on schizoid features in children and adolescents, which included solitariness, lack of empathy, abnormal sensitivity, rigid mindset, an especially pervasive interest in patterns, and unusual communications[16]. Schizoid children with blood family members who suffered schizophrenia shared many common features, and were at high risk of developing schizophrenia in adulthood[17]. However, to our knowledge, there has been little research on the association between schizoid characteristics and aggressive behavior. Based on studies at this date, we hypothesized that schizoid may be closely associated with aggressive behavior in Chinese school adolescents.

Childhood trauma has been linked to schizotypy and aggressive behavior[18-20], and can be categorized as emotional and physical neglect, or physical, emotional, and sexual abuse occurring before the age of 16 years[21]. A review suggested that in wealthy countries trauma affects as many as 16% of children annually[22]. Thus, childhood trauma is a public health and social welfare problem. Toutountzidis et al.[23] found an association between emotional abuse and both positive and negative psychosis-like traits. Marzillier et al.[18] observed that individuals with schizotypy were vulnerable to frequent trauma-related intrusions. We previously reported that schizotypy was a risk factor of childhood trauma among college students[19]. Huang et al.[24] also confirmed that individuals at high risk of psychosis had experienced more childhood trauma.

Studies have linked childhood trauma to aggression. For example, individuals with childhood trauma had a higher risk of perpetrating violence, according to a systematic review and meta-analysis of prospective studies by Fitton et al.[20]. In China, juvenile violent offenders were more likely to have suffered physical and emotional trauma during early childhood[25]. A systematic review and meta-analysis showed that individuals with psychosis who reported childhood maltreatment were more likely to perpetrate violence[26]. McGuigan et al.[27] found that in adolescent boys physical neglect in childhood strongly predicted violent behavior.

Given the associations among schizotypy, childhood trauma, and aggression, our second hypothesis is that childhood trauma may mediate the link between schizoid and aggression. Several previous studies explored mediating factors between schizotypy and aggression, including

perceived criticism and irritability, peer victimization, peer problems, and low self-esteem[12, 14, 28]. However, the present study is the first to propose that childhood trauma mediates the association between schizoid and aggression. This exploratory model may help us better understand the underlying mechanism, and suggest potential interventions.

In addition, recent adverse life events such as loss of family member or exam failure may be an important mediator between schizoid and aggressive behaviors. Schizotypy may increase the risk of childhood trauma and adverse life events. For example, Raine et al.[12] observed that school children with schizotypal traits were likely to suffer from peer victimization. There is also an association between adverse life events and aggression[29] Huang et al. found that stressful life events increased the odds of aggression[30]. Considering the above studies, our third hypothesis is that adverse life events may be as important as childhood trauma in mediating the association between schizoid and aggression.

Some studies have found that an experience of childhood trauma may influence the cognition of recent negative stimulation. For example, Catalan et al.[31] reported that people with childhood trauma frequently interpreted facial expressions of anger and fear as neutral and happy. Aas et al.[32] found a history of trauma in childhood was associated with greater differentiation in brain responses to negative facial expressions, compared with positive facial expressions, irrespective of the presence of severe mental disorder. Patients with schizophrenia and childhood trauma also interpreted emotional expressions more negatively. These studies suggest that recent adverse life events may trigger different brain responses in individuals who had experienced childhood trauma, compared with individuals without such history. Therefore, our fourth hypothesis is that schizoid or psychotic symptoms and aggression may be the result of an interaction between childhood trauma and recent life events.

The present study investigated the hypotheses explicated above: that in Chinese adolescents, schizoid is associated with aggressive behavior, that childhood trauma and adverse life events are dependently and independently associated with schizoid and aggression.

2 Method

2.1 Participants

The Ethics Committee of Second Xiangya Hospital of Central South University approved this study. All subjects participated voluntarily. The subjects and their parents or guardians provided signed informed consent.

An epidemiological survey of child and adolescent mental disorders was conducted from April to July 2014 in Hunan Province, China[33]. Adolescents numbering 17,071, aged 6 to 16 years, from 13 schools, completed the Achenbach Child Behavior Checklist (CBCL). There are 3465 students were CBCL-positive and 13606 were CBCL-negative. 10% of CBCL-negative students were randomly selected and matched 1:1 with CBCL-positive students. Two groups of 3465 students each (aged 6 to 16 years), CBCL-positive and CBCL-negative respectively, were surveyed via the Childhood Trauma Questionnaire-Short Form (CTQ-SF) and Adolescent Self-rating Life Event Checklist (ASLEC). Finally, 3094 students (aged 12 to 16 years) who also effectively completed the CTQ-SF and ASLEC were included in this study. This group comprised 1586 and 1508 boys and girls, respectively (aged 13.57 ± 1.291 and 13.73 ± 1.306 y).

Among the boys, 521 (32.85%) had siblings, 641 (50.69%), 442 (27.86%), and 340 (21.44%), respectively, lived in rural, urban, and urban-rural areas, and 1237 (77.99%), 254 (16.02%), and 95 (5.99%) considered their family's economic status as average, relatively wealthy, or financially constrained. Among the girls, 1296 (85.94%) had siblings, 867 (57.49%), 336 (22.28%), and 305 (20.23%) lived in rural, urban-rural, and urban areas, and 1228 (81.43%), 198 (13.13%), and 82 (5.44%) considered their family's economic status as average, relatively wealthy, or financially constrained.

2.2 Materials

2.2.1 Achenbach Child Behavior Checklist (CBCL)

The CBCL as compiled by Achenbach and Edelbrock[34] is divided into three parts. The third part consists of Behavioral Questions that comprise 113 items. In the present study, each item was evaluated by the parents according to the true situation of the child, and was scored on a three-level scale as 0, 1, or 2. The 113 items were summarized as 8 factors that included schizoid and aggressive behaviors with 9 and 22 items, respectively. The scores for the schizoid and aggressive behavior factors are each the sum of the scores of their respective items. Higher score indicated greater behavioral problems.

Su et al.[35] defined the Hunan norm, and after the reliability validity test, they concluded that the 12- to 16-year-old norms for boys and girls were accurate for children of Hunan province, China. The test-retest reliability of the behavioral problem portion is 0.77, and the standard validity is 0.61 to 0.76[35].

2.2.2 Childhood Trauma Questionnaire-Short Form (CTQ-SF)

The CTQ-SF consists of 25 items and 3 validity items that can be categorized as 5 factors: emotional abuse, physical abuse, emotional neglect, physical neglect, and sexual abuse[21]. Each item is scored on 5 levels, from never (1 point) to always (5 points). Each factor is scored between 5 and 25 points, with a total score from 25 to 125 points. The CTQ-SF was also shown to have good validity among adolescents[21]. The Chinese version has been validated to assess childhood trauma among Chinese adolescents. The total scale Cronbach's α was 0.73, with Cronbach's α for emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect ranging from 0.23 to 0.74. The content validity test subscales and total scale correlation coefficients were > 0.5 [36].

2.2.3 Adolescent Self-Rating Life Event Checklist (ASLEC)

The ASLEC is a self-assessment questionnaire consisting of 27 items concerning adverse life events during the previous 12 months that cause psychological reactions in adolescents. Each item first determines whether the event occurred within the last 12 months. If not, the item is scored 0 points. If so, its psychological effect at the time of occurrence is assessed on a 5-level scale, from 1 for no effect, to 5 points for extreme severity. The Chinese version has good internal consistency (0.92), test-retest reliability (0.73), and standard validity[37].

2.3 Statistical analysis

The statistical analysis was conducted using SPSS 26.0 (IBM) with the Process 3.2 plug-in. Because of the disparity in the scoring criteria of the CBCL between boys and girls, the present study chose to analyze the data separately by gender. According to a previous study[38], boys with scores >8 points or girls with scores >4 points for schizoid factors were classified as the schizoid group, and the remaining were identified as the non-schizoid group. The scores for aggressive behaviors, ASLEC, and each dimension of the CTQ-SF in the schizoid group and non-schizoid groups were compared via independent-sample t-test. Analyses of correlations among the scores for schizoid, aggressive behaviors, ASLEC, and each CTQ-SF dimension (emotional abuse, physical abuse, sexual abuse, emotional neglect, and physical neglect) were conducted via Pearson's correlation analysis. Schizoid, aggressive behaviors, ASLEC, and childhood trauma scores in various dimensions were used to predict aggressive behavior scores via linear regression. Using the Process 3.2 plug-in to perform mediation analysis with bootstrapping to 5000 (Model 4) and moderation analysis (Model 3). In the mediation model, if the 95% confidence interval did not include zero, it was considered statistically significant. For other tests, statistical significance was set at $P < 0.05$.

3 Results

3.1 Comparison of the scores for aggressive behaviors, ASLEC, and each dimension of the CTQ-SF between the schizoid and non-schizoid groups

In boys, the scores for aggressive behaviors, emotional abuse, and ASLEC were significantly higher in the schizoid group than in the non-schizoid group ($P < 0.001$, 0.003 , <0.001 , respectively, Table 1). In girls, the schizoid group had significantly higher scores for aggressive behaviors, emotional abuse, physical abuse, emotional neglect, and ASLEC compared with the non-schizoid group ($P < 0.001$, each), while that of physical neglect was significantly lower ($P = 0.005$).

3.2 Correlation analysis of the scores of schizoid, aggressive behaviors, ASLEC, and each dimension of the CTQ-SF

In both boys and girls, scores for schizoid positively correlated with the scores for aggressive behaviors, ASLEC, and the 4 dimensions of the CTQ-SF (emotional abuse, physical abuse, sexual abuse, and emotional neglect, $P < 0.001$, Table 2). Aggressive behaviors significantly correlated with the scores of ASLEC and the 4 dimensions of the CTQ-SF (emotional abuse, physical abuse, sexual abuse, and emotional neglect, $P < 0.001$). The ASLEC score positively correlated with the 4 dimensions of the CTQ-SF (emotional abuse, physical abuse, sexual abuse, and emotional neglect, $P < 0.001$) and negatively correlated with physical neglect ($P < 0.001$).

3.3 Linear regression model to predict aggressive behaviors

Based on the results of the correlation analyses, only relevant variables were included for the linear regression analysis (Table 3). In boys, aggressive behaviors were significantly positively predicted by schizoid ($\beta = 0.620$, $P < 0.001$), emotional neglect ($\beta = 0.045$, $P = 0.021$), and ASLEC score ($\beta = 0.125$, $P < 0.001$). In girls, positive predictors of aggressive behaviors were the following: schizoid ($\beta = 0.638$, $P < 0.001$), emotional abuse ($\beta = 0.118$, $P < 0.001$), and ASLEC score ($\beta = 0.061$, $P = 0.003$), sexual abuse ($\beta = -0.062$, $P = 0.003$) was significant negative predictor.

3.4 Mediation analysis for the association between schizoid and aggressive behaviors

In boys, the ASLEC score and emotional neglect mediated the association between the schizoid and aggressive behaviors scores, as 95% confident intervals (CIs) did not include zero (Table 4). The scores for emotional abuse, physical abuse, sexual abuse, and physical neglect did not mediate the association between schizoid and aggressive behaviors. In girls, the results revealed that ASLEC score, emotional abuse, and

sexual abuse mediated the association between the schizoid and aggressive behaviors scores, as 95% CIs did not include zero. The scores for physical abuse, emotional neglect, and physical neglect did not mediate the association between the aggressive behaviors scores.

3.5 Interactions between the scores for childhood trauma and the ASLEC moderated the association between schizoid and aggressive behaviors

According to the study hypotheses, this study further tested the interaction effect between the childhood trauma and ASLEC scores to moderate the association between the schizoid and aggressive behaviors scores (See Table 5). In boys, there was no interaction effect between childhood trauma and the scores of ASLEC to influence the association between schizoid and aggressive behaviors. However, in girls that the results did reveal an interaction effect between childhood trauma and the scores of ASLEC that influenced aggressive behaviors ($P = 0.023$).

4 Discussion

4.1 Adolescents with schizoid reported higher scores for adverse life events and childhood trauma

The study determined that boy and girl adolescents with schizoid had suffered more emotional abuse and adverse life events, and displayed greater aggressive behavior, compared with boy and girl adolescents without these features. In addition, schizoid girl adolescents were more likely than those without schizoid features to have experienced physical abuse and emotional neglect. The results of the present study are consistent with other reports in which individuals with schizoid personalities were more likely to experience adverse life events[39] and childhood trauma compared with healthy control groups[24]. In addition, Kelleher et al.[40] found that patients with psychotic disorders were more likely to have experienced more severe childhood maltreatment compared with healthy individuals. A meta-analysis showed that childhood maltreatment was quite common among people with a high risk of psychosis, and childhood trauma was strongly associated with psychotic status[41].

These results imply that adolescents with schizoid features are likely to live in an environment where maltreatment is pervasive. In addition, people with schizotypal personality disorder displayed an abnormal subjective experience of emotion, such as lack of social pleasure[42], which makes them more difficult to understand in social settings. The results of the present study also indicated that childhood trauma affects boy and girl schizoid adolescents differently. Girl schizoid adolescents are affected more broadly. And this is the first study to report differences in between the genders in adolescents with schizoid.

4.2 Schizoid was a predictor of aggressive behaviors

In the present study, adolescents with schizoid achieved higher aggression scores compared with normal peers, and linear regression analysis suggested that schizoid could predict aggressive behavior in boy and girl adolescents. This is consistent with most other similar studies, in which aggression was common in people with mental disorders[12, 14, 43]. Wong et al.[14] found that schizotypal personality disorder in children and adolescents was associated with reactive aggression. This may be due mainly to the close link between aggressive behaviors and symptoms, and symptoms may affect social associations[44]. For example, patients with mental disorder may display aggressive behavior under the influence of command auditory hallucination[45, 46]. Individuals with schizoid are likely to feel insecure when under the influence of delusion, which leads to hostility and aggressive behavior[47]. In addition, many people with schizoid personality and schizophrenia have interpersonal problems. They are more likely to misunderstand the intentions of others while communicating, which can result in aggressive behavior[48]. Some studies report that people with schizophrenic personality and schizophrenia are more likely to display violent behavior due to substance abuse[49]. Raine et al.[12] found that in adolescents schizoid elicit peer victimization, which also results in aggressive behavior. Therefore, interventions such as social skills training and peer education are recommended for adolescents with schizoid to prevent aggressive behaviors.

4.3 Adverse life events and type of maltreatment type predict aggressive behaviors differently by gender

In the present study, the linear regression analysis revealed that adverse life events could positively predict aggressive behavior in adolescent boys and girls. Those who experienced adverse life events were more likely to display aggression. These results are consistent with previous articles[50, 51]. A study conducted among adolescents in Ontario Canada found that adolescents exhibited aggressive behavior because of neglect, specifically when their caregivers no longer played a caregiving role[52].

In the present study, emotional neglect was a positive predictor of aggressive behavior in boy adolescents, and emotional abuse was a positive predictor of aggressive behavior in girl adolescents. This suggests a difference in gender response to trauma that affects aggressive behavior. A prior study found that childhood neglect influences adult violent behavior[53]. Another research reported that chronic neglect at an early age predicted aggressive behavior in later life, and compared with girls, boys were more likely to show aggressive behavior[54]. McGuigan et al.[27] found that neglect was a powerful predictor of aggressive behavior among male adolescents, after controlling for domestic violence and physical abuse. This is consistent with our results.

In our study, emotional abuse was a positive predictor of aggressive behavior in girl adolescents, not in males. Given the small effect of emotional abuse on aggressive behavior, a sampling error may be the cause. Interestingly, sexual abuse was negative predictor of aggressive

behavior in girl adolescents, which is inconsistent with another study[55]. Kozak et al.[55] found that boy and girl adolescents who had experienced sexual abuse were 1.7-fold more likely to behave violently compared with those who had not. Their results showed that sexual abuse predicted violent behavior more in boys than in girls. This does not agree with our results, in which sexual abuse was a negative predictive factor for aggression in girls but not in boys. The one possible reason may be that girls were more distressed and were more prone to self-blame after sexual abuse and were more likely to use coping strategies of withdrawal and attempted amnesia[56]. In addition, girls who suffered from sexual abuse were more likely than boys to develop internalized problems such as suicide attempts and depression[57].

The effect of adverse life events and childhood maltreatment on aggressive behavior may involve a variety of psychological and biological mechanisms. For example, abused subjects experienced higher levels of narcissistic vulnerability, which partially mediated the association between childhood maltreatment and aggression[58]. A potential biological mechanism may be related to genetically based phenotype. It has been reported that aggression is a complex behavior involving a synergetic interaction between genetics and environment[59]. Other studies found that childhood maltreatment may modify the association between social information processing and adult aggression, leading to increased aggressive behavior[60].

4.4 Mediation model of schizoid and aggressive behavior

In accord with previous studies, the present found a close association between schizoid, childhood maltreatment, adverse life events, and aggressive behavior[43, 61]. These results are consistent with our second and third hypotheses, that childhood trauma may mediate the link between schizoid and aggression, and that adverse life events may be as important as childhood trauma in influencing the association between schizoid traits and aggression. The model showed that adverse life events mediated the association between schizotypal personality disorder and aggressive behaviors.

Adolescents with schizoid features are more likely to experience adverse life events[39], which in turn is a documented risk factor of aggression. In the boys of the present study, emotional neglect mediated the association between schizoid and aggressive behaviors, while in the girls, emotional and sexual abuse mediated this association. It is worth mentioning that in girls sexual abuse has a negative mediating effect on the association between schizoid and aggressive behaviors. Our results are in agreement with Norton-Baker et al.'s[62], which found that links between sexual abuse and aggressive behavior tended to be stronger in girls than in boys.

Among adverse life events, reducing childhood maltreatment in adolescents with schizoid traits may be crucial to reduce their aggressive or violent behavior, whereas parental love, the friendly support of teachers and classmates, and financial resources may be important protective factors. For example, Family Attachment Narrative Therapy was used to heal the bad effect of childhood maltreatment[63]. If adolescents with schizoid traits are raised in an abusive environment, then timely interventions, such as behavior management and therapy, should be implemented at home and at school.

4.5 Moderation model of schizoid and aggressive behavior

The interaction between childhood trauma and adverse life events affected aggressive behavior in the girls, but not in boys. This is the first time that this gender difference is reported. Functional magnetic resonance imaging (fMRI) studies have shown that in girls maltreatment could lead to changes in the amygdala[64]. These changes can result in abnormal activation when adolescents with childhood maltreatment experience adverse life events, leading to aggressive behaviors[65]. In addition, another study found that childhood maltreatment can be associated with dysfunction of the hypothalamus-pituitary-adrenal axis (HPA)[66], and aggressive behavior is closely related to HPA function[67]. Our findings suggest that girls are highly affected by adverse life events and develop aggressive behavior after experiencing childhood maltreatment. This may be because girls are more prone to attenuation of the HPA axis after experiencing childhood maltreatment[68].

5 Limitations

There are several limitations to this study. First, the CTQ-SF and ASLEC are retrospective questionnaires, which can cause recall bias. Second, this was a cross-sectional study, so the association between schizoid and aggressive behaviors should be verified. In addition, there were overlaps between childhood maltreatment and adverse life events, such as the pressure from parents. There are also childhood adversities that were not included in this analysis, such as natural disasters or parents' divorce. Finally, the CTQ-SF method assessed only the severity of 5 types of childhood maltreatment, and did not include the time of occurrence, frequency, or duration of maltreatment. Previous studies have shown that the earlier the maltreatment begins, the longer it lasts, and the greater its effect on mental health[69]. In future studies, these missing potential factors should be addressed, and include a follow-up.

6 Conclusion

This is the first study to investigate the association between childhood trauma, life events, schizoid and aggressive behaviors in Chinese adolescents. It was found that adolescent with schizoid were more likely to experience childhood trauma, adverse life events and have

aggression. Adverse life events, childhood trauma (emotional neglect in boys and emotional abuse in girls) and schizoid independently increased aggression. Individuals with schizoid who experienced childhood trauma were more likely to display aggressive behavior when facing adverse life events. Therefore, reducing childhood trauma (especially emotional neglect in boys and emotional abuse in girls) and adverse life events can decrease the risk of aggressive behavior among adolescents with schizoid.

Declarations

Ethics approval and consent to participate

The Ethics Committee of Second Xiangya Hospital of Central South University approved this study.

Consent for publication

The subjects and their parents or guardians provided signed informed consent for publication.

Availability of data and materials

The raw data required to reproduce these findings cannot be shared at this time as the data also forms part of an ongoing study.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was supported by the National Science and Technology Support Plan - Epidemiological Investigation of Mental Disorders among Chinese Children and Adolescent [grant number 2012BAI01B02], Guangdong Basic and Applied Basic Research Foundation [grant number 2019A15110047], Science and Technology Innovation Committee of Shenzhen [grant number JCYJ20190809155019338], Hunan Provincial Innovation Foundation for Postgraduate [grant number CX2019159].

Authors' contributions

TY was mainly responsible for manuscript writing and interpretation of data. YH contributed to interpretation of data and manuscript revisions and analysed the data. SW contributed to the acquisition of data. XL conceived and designed the study. JL contributed to the acquisition of data, manuscript revisions, and intellectual content. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

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Tables

Table 1. Scores for aggressive behaviors, each dimension of the CTQ-SF, and ASLEC between the schizoid and non-schizoid groups by gender [†]

	Group	Boys			Girls		
		Score	t	P	Score	t	P
Aggressive behaviors	Schizoid	19.60 ± 6.687	13.693	<0.001	15.94 ± 7.036	25.062	<0.001
	Non-schizoid	5.51 ± 5.232			5.51 ± 5.232		
Emotional abuse	Schizoid	8.07 ± 3.626	3.137	0.003	7.73 ± 3.248	6.944	<0.001
	Non-schizoid	6.58 ± 2.518			6.43 ± 2.007		
Physical abuse	Schizoid	6.65 ± 3.118	1.366	0.177	5.91 ± 2.196	3.821	<0.001
	Non-schizoid	6.09 ± 2.403			5.42 ± 1.339		
Sexual abuse	Schizoid	6.07 ± 2.887	1.492	0.141	5.37 ± 1.780	1.896	0.059
	Non-schizoid	5.51 ± 1.887			5.17 ± 0.979		
Emotional neglect	Schizoid	12.78 ± 5.764	1.863	0.067	11.61 ± 5.348	4.392	<0.001
	Non-schizoid	11.38 ± 5.126			10.21 ± 4.296		
Physical neglect	Schizoid	9.60 ± 3.761	-0.229	0.819	8.95 ± 3.397	-2.842	0.005
	Non-Schizoid	9.70 ± 3.366			9.53 ± 3.246		
ASLEC [‡]	Schizoid	26.97 ± 16.601	5.424	<0.001	21.37 ± 13.890	10.901	<0.001
	Non-schizoid	15.91 ± 15.444			12.08 ± 12.956		

[†]The schizoid and non-schizoid groups comprised, respectively, 60 and 156 boy participants and 330 and 1178 girls.

[‡]Adolescent Self-Rating Life Event Checklist

Table 2. Correlations for the scores of schizoid, aggressive behaviors, each dimension of CTQ-SF, and ASLEC in boy and girl adolescents (r)

Gender		Schizoid	Aggressive behaviors	Emotional abuse	Physical abuse	Sexual abuse	Emotional neglect	Physical neglect	ASLEC
Boys	Schizoid	1							
	Aggressive behaviors	0.656**	1						
	Emotional abuse	0.228**	0.195**	1					
	Physical abuse	0.146**	0.118**	0.640**	1				
	Sexual abuse	0.117**	0.077*	0.467**	0.477**	1			
	Emotional neglect	0.090**	0.113**	0.272**	0.240**	0.169**	1		
	Physical neglect	-0.004	-0.045	0.219**	0.200**	0.225**	0.402**	1	
	ASLEC [†]	0.267**	0.293**	0.356**	0.307**	0.157**	0.127**	-0.088**	1
Girls	Schizoid	1							
	Aggressive behaviors	0.689**	1						
	Emotional abuse	0.240**	0.299**	1					
	Physical abuse	0.148**	0.183**	0.518**	1				
	Sexual abuse	0.084**	0.056*	0.330**	0.438**	1			
	Emotional neglect	0.132**	0.164**	0.346**	0.261**	0.153**	1		
	Physical neglect	-0.045	-0.029	0.174**	0.079**	0.157**	0.336**	1	
	ASLEC [†]	0.318**	0.311**	0.363**	0.290**	0.133**	0.151**	-0.140**	1

*P < 0.05; **P < 0.001

[†]Adolescent Self-Rating Life Event Checklist

Table 3. Linear regression model to predict aggressive behaviors in boy and girl adolescents

Gender	Variables	B	SE	β [†]	t	P
Boys	Schizoid	1.687	0.053	0.620	31.551	<0.001
	Emotional abuse	0.066	0.073	0.024	0.911	0.362
	Physical abuse	-0.079	0.075	-0.027	-1.053	0.292
	Sexual abuse	-0.079	0.082	-0.021	-0.970	0.332
	Emotional neglect	0.063	0.027	0.045	2.311	0.021
	ASLEC [‡]	0.057	0.009	0.125	6.049	<0.001
Girls	Schizoid	1.520	0.046	0.638	32.781	<0.001
	Emotional abuse	0.351	0.069	0.118	5.105	<0.001
	Physical abuse	0.128	0.103	0.028	1.240	0.215
	Sexual abuse	-0.367	0.121	-0.062	-3.028	0.003
	Emotional neglect	0.049	0.030	0.032	1.623	0.105
	ASLEC [‡]	0.032	0.011	0.061	2.971	0.003

[†]β, standardized beta coefficient; B, unstandardized beta; SE, standard error

[‡]Adolescent Self-Rating Life Event Checklist

Table 4. Indirect paths for the scores of ASLEC and each dimension of the CTQ-SF mediating the association between schizoid and aggressive behaviors in boy and girl adolescents

Gender	Paths	Effect	Boot SE [†]	Boot LLCL [†]	Boot ULCL [†]
Boys	Schizoid → ASLEC → Aggressive behaviors	0.0823	0.0192	0.0475	0.1226
	Schizoid → Emotional abuse → Aggressive behaviors	0.0187	0.0188	-0.0181	0.0562
	Schizoid → Physical abuse → Aggressive behaviors	-0.0095	0.0119	-0.0338	0.0127
	Schizoid → Sexual abuse → Aggressive behaviors	-0.0045	0.0080	-0.0216	0.0107
	Schizoid → Emotional neglect → Aggressive behaviors	0.0163	0.0073	0.0041	0.0322
	Schizoid → Physical neglect → Aggressive behaviors	0.0006	0.0044	-0.0082	0.0098
Girls	Schizoid → ASLEC → Aggressive behaviors	0.0429	0.0169	0.0123	0.0777
	Schizoid → Emotional abuse → Aggressive behaviors	0.0691	0.0180	0.0362	0.1079
	Schizoid → Physical abuse → Aggressive behaviors	0.0096	0.0097	-0.0068	0.0314
	Schizoid → Sexual abuse → Aggressive behaviors	-0.0120	0.0075	-0.0306	-0.0014
	Schizoid → Emotional neglect → Aggressive behaviors	0.0119	0.0073	-0.0010	0.0278
	Schizoid → Physical neglect → Aggressive behaviors	0.0020	0.0029	-0.0028	0.0087

[†]Boot, bootstrapping; LLCL, lower level confidence limit; ULCL, upper level confidence limit

[‡]Adolescent Self-Rating Life Event Checklist

Table 5. Interaction effect between childhood trauma and the scores of ASLEC moderating the association between schizoid and aggressive behaviors

Gender	Variables	Coeff	SE	t	P
Boys	Schizoid	2.090	0.301	6.937	Nil
	ASLEC	0.110	0.047	2.346	0.019
	Schizoid*ASLEC	-0.013	0.010	-1.293	0.196
	Childhood trauma	0.032	0.030	1.063	0.288
	Schizoid*Childhood trauma	-0.006	0.007	-0.825	0.410
	ASLEC* Childhood trauma	-0.001	0.001	-0.696	0.487
	Schizoid* ASLEC* Childhood trauma	Nil	Nil	0.611	0.541
Girls	Schizoid	1.388	0.282	4.918	Nil
	ASLEC	-0.071	0.057	-1.252	0.211
	Schizoid*ASLEC	0.012	0.010	1.266	0.206
	Childhood trauma	0.014	0.034	0.410	0.682
	Schizoid*Childhood trauma	0.006	0.007	0.792	0.429
	ASLEC* Childhood trauma	0.003	0.002	2.282	0.023
	Schizoid* ASLEC* Childhood trauma	Nil	Nil	-1.722	0.085

[†]Adolescent Self-Rating Life Event Checklist