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Children's emotional intelligence and aggressive behavior: The mediating roles of positive affect and negative affect

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ABSTRACT

Objective: Although previous studies have noted that emotional intelligence (EI) might be a significant protective factor for aggressive behavior, the specific mechanisms involved is largely unknown. Based on the General Aggressive Model, this cross-sectional study aims to investigate whether EI will influence aggressive behavior through the mediating roles of positive affect (PA) and negative affect (NA).

Methods: A total of 410 primary school students (45.4% females; $M_{age} = 10.35$, $SD = 0.48$, range from 10 to 11 years) from Shenzhen, China, completed questionnaires on EI, aggressive behavior, PA, and NA. SPSS 22.0 was used for reliability test and correlation analysis, and (Hayes, 2013) [1] PROCESS macro (Model 6) was used to examine the multiple mediation model.

Results: The results show that (a) EI was negatively associated with children's aggressive behavior; (b) NA partially mediated the link between EI and aggressive behavior in children, and (c) PA and NA sequentially mediated the above link.

Conclusion: This study would not only deepen our understanding of how EI is associated with aggressive behavior but also provide valuable suggestions for teachers and parents to more effectively prevent and intervene children's aggressive behavior.

1. Introduction

Aggressive behavior has always been an important research field at home and abroad. Since the 1930s, American psychologists have observed the origin and manifestations of aggressive behavior, and by the 1970s, great progress has been made in theoretical exploration and experimental research in this field [1]. At the same time, recent research in China also shows that about 38.6% of students had experienced bullying in school [2]. Bullying is a special type of aggressive behavior and can be classified as a subset of aggressive behavior [3]. Aggression is the act or tendency to intentionally harm another person (including physical or psychological injury) and usually involves the psychological states of resentment or wanting to harm others [4]. Previous research on primary school students shows that, since fifth grade, children's emotional experiences are strengthened as their self-awareness emerges [5]. At the same time, childhood aggression can significantly predict adolescent aggression or even aggression in adulthood [6]. Given the importance of aggressive behavior in human development, it is necessary to understand the causes of aggression and develop intervention programs for the prevention and intervention of aggressive behavior in children.

Research shows that children's emotional intelligence is an important contributor to aggressive behaviors [7–9]. Emotional

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intelligence (EI) refers to an individual's capacity to perceive emotions, assimilate emotion-related feelings, understand the information about those emotions, and manage them [10]. According to the general aggression model (GAM) [11–13], personal factors (e.g., EI, personality trait, gender) and situational factors ((i.e., affect, cognition, arousal) which then leads to aggressive behaviors. Consistent with GAM, individuals with high EI can better regulate emotional states and reduce aggressive behaviors than individuals with lower EI, and several studies further verified that there is a significant negative correlation between EI and aggressive behavior among middle school students [14–16]. However, few studies have explored the mechanism through which EI influences aggressive behavior. Therefore, based on the GAM, this study will focus on the internal state of the individual (i.e., affect) and further examine the mediating roles of positive and negative affect in the association between EI and aggressive behavior among children.

1.1. The mediating role of Positive affect

Positive affect (PA) is related to the satisfaction of needs, usually accompanied by pleasant experiences, and can improve one's engagement and vitality in daily activities [17]. Fridrickson (2001) divides positive affect into some general elements (i.e., joy, interest, contentment, pride and love). According to GAM, personal factors may influence emotional state, and then affect an individual's behavior. Specifically, high levels of EI might promote PA experience, which could reduce aggressive behavior.

From the perspective of GAM, emotional experience is closely associated with aggressive behavior. PA is negatively related to aggressive behavior [18–20]. When people experiencing PA, they tend to engage in altruistic behavior rather than aggressive behaviors to keep themselves in a good mood [21]. For example, vocational school students with higher levels of PA had lower levels of aggressive behavior than those with lower levels of PA [22].

At the same time, EI will influence an individual's emotional state. Consistent with GAM, many studies have shown that higher levels of EI were associated with more PA [23,24]. For example, an intervention study on left-behind children showsthat individuals with high EI can better perceive and control emotional cues in themselves and people surrounding them, leading ultimately to more positive affects [25].

Therefore, the following hypothesis is proposed.

Hypothesis 1. Positive affect could mediate the relation between emotional intelligence and aggressive behavior.

1.2. The mediating role of Negative affect

Negative affect (NA) quantifies the degree to which a person experiences unpleasant feelings such as sadness, restlessness, and irritability [26]. Consistent with the GAM, many studies have found that NA (e.g., anger, sadness) can trigger aggressive behaviors in children [27–29]. For example [30], studied the relation between physical aggression and anger among 361 juvenile offenders and 206 students. They found that anger was significantly associated with physical aggression and that adolescent offenders also reported higher levels of anger compared to ordinary students. In addition [31], studied the relation between anger and aggression among children aged 9 to 13. They found that people with higher levels of aggression experienced more NA in provocative situations.

Furthermore, an individual's EI level seems to be associated with NA. According to the emotional regulation theory, emotion regulation is the process by which individuals influence which emotions they have, and how they experience and express those emotions [32,33]. Based on this theory, it is difficult for individuals with low EI to understand and adjust their NA [34]. For example, an intervention study found that high-aggressive children had deficits in emotional regulation, while children in the low-aggressive group were better able to control their NA (e.g., sad, anger) and minimize the duration of NA [35].

Therefore, this study proposes the following hypothesis.

Hypothesis 2. Negative affect could mediate the relation between emotional intelligence and aggressive behavior.

1.3. Multiple mediating effects of Positive affect and Negative affect

The "broaden and build" theory developed by Fredrickson offers a possibility that a generally positive mental status could help people regulate NA when life comes to a hurdle [36]. This theory suggests that a broaden-and-build mental state allows the individual to explore more effective resolutions to their problems. Through this mechanism, PA can help individuals restore balanced states more quickly [37].

An intervention study activated the participants' contentment, amusement, sadness, and calm mental status through different tasks, and then give all subjects NA stimulation [38]. They found that the PA group showed the fastest recovery from fear, and the sad group took the longest time. According to this study, the group that was experimentally positioned to a positive affect mental status had more tools at their hands to deal with stressful events (i.e., the stimuli that typically incur fear). Subsequently, when the stressful event occurred, participants in the positive affect group quickly resorted to effective coping techniques thus experienced less negative affect compared to participants in other experimental groups. If, based on our reasoning above, people with high emotional intelligence are generally superior compared to their peers on perceiving others' emotions and regulating their own emotions, then they should also enjoy a resourceful mindset when facing life stressors. Based on the above reasoning, we propose the following hypothesis.

Hypothesis 3. Positive affect and negative affect could sequentially mediate the relation between emotional intelligence and aggressive behavior.

1.4. The present study

Based on GAM, this cross-sectional study aims to examine the associations among children's EI, PA, NA and aggressive behavior by examining a multiple mediation model to address four questions (see Fig. 1): (1) whether EI would positively influence adolescent aggressive behavior; (2) whether PA would mediate the relationship between EI and aggressive behavior; (3) whether NA would mediate the relationship between EI and aggressive behavior; (4) whether PA and NA would act as sequential mediators in above relationship. This study would not only deepen our understanding of how EI is associated with aggressive behavior, but also provide valuable suggestions for teachers and parents to more effectively prevent and intervene children's aggressive behavior.

2. Method

2.1. Participants

We surveyed 411 public primary school students from Shenzhen (a Special Economic Zone in China), China, using a convenience sampling method (Inclusion criteria: children aged between 10 and 12 years old; Exclusion criteria: Children with physical disabilities, mental retardation, attention deficit and hyperactivity disorder). One participant was excluded from data analysis because the individual chose the same option for all survey items [39] and the final sample consisted of 410 primary school students (45.4% females; $M_{age} = 10.35$, $SD = 0.48$, *range* = 10–11 years).

2.2. Procedure

Data collection is completed with the informed consent of children and their parents. Firstly, two well-trained graduate students explained the purpose, contents and confidentiality rules of this survey in the classroom setting, and then, the participants signed the informed consent form. Finally, all participants filled out the questionnaire within 25 min. This research was approved by the Research Ethics Committee in the first author's affiliation.

2.3. Measurements

2.3.1. Emotional intelligence

The Emotional Intelligence Scale for Chinese Participants was created by Ref. [34]. The scale uses a 7-point Likert scale (*1 = strongly disagree*, *7 = strongly agree*) with four dimensions: self-emotion appraisal (SEA), other's emotion appraisal (OEA), use of emotion (UOE), and regulation of emotion (ROE), and each dimension includes four items (e.g., "I really understand what i feel."; "I am sensitive to the feeling and emotions of others."; "I am a self-motivated person."; "I have good control of my own emotions."). Participants scored between 16 and 112, with higher scores indicating higher levels of EI. The scale has shown good reliability among Chinese students [40,41]. In this research, the Cronbach's alpha of this scale was 0.95.

2.3.2. Aggressive behavior

The self-report Aggression Questionnaire (AQ) [42] was used to measure the degree of aggressive behavior, and the questionnaire was revised to make it more suitable for Chinese children. This scale contains 12 items with two dimensions, which include physical aggression (7 items; e.g., "I have become so mad that I have broken thing."), and verbal aggression (5 items; e.g., "I often find myself disagreeing with people."). Subjects rated these items on a five-point Likert scale (*1 = extremely uncharacteristic of me*, *5 = extremely characteristic of me*). Total scores range from 12 to 60, and higher scores indicate more aggressive behaviors. The scale has shown good reliability among Chinese children [43,44]. In the present study, the Cronbach's alpha of this scale was 0.87.

2.3.3. Positive affect

We used the Negative and Positive Affect Scale (NAPAS) as revised by Ref. [45]. The scale is based on a five-point Likert scale (*1 = none of the time*, *5 = all to the time*) and consists of two subscales. The PA subscale includes five items (e.g., "I feel very satisfied."), participants scores ranged from 5 to 25. High PA scores represent a state of satisfaction and happiness. The scale has shown good

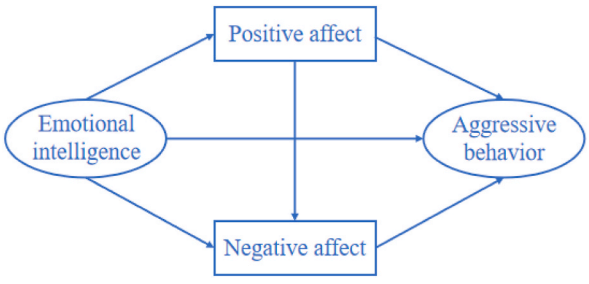

Fig. 1. The conceptual model.

reliability among prior research [46,47]. The Cronbach's α for the scale in this study was 0.90.

2.3.4. Negative affect

We used the Negative and Positive Affect Scale (NAPAS) as revised by Ref. [45]. The negative affect subscale also includes five items (e.g., "I feel so sad that there is nothing could cheer me up."). High NA scores indicate a state of pain and irritability. This scale has demonstrated good reliability in prior research [46,47]. The Cronbach's α for the scale in this study was 0.90.

2.4. Common method bias

To avoid the influence of common method bias, we used reverse scoring questions and anonymous questionnaires in the study. The result of Harman's single-factor test showed that 6 eigenvalues greater than 1 were extracted, the first factor explained 36.95% of the variance, which is below the critical standard: 40%. This suggests that there are no serious common method biases in the data [48].

2.5. Data analyses

First, correlations between variables were analyzed using SPSS 22.0 software and the Bonferroni's Correction was applied to control for the type I error [49]Accordingly, the significance level for correlation analyses was set at $p < 0.0083$ (0.05/6). Second [50], PROCESS macro (Model 6) was then used to examine the mediation model. Finally, previous research has shown significant gender and age differences in children's aggression [51,52], so gender and age were controlled for in the mediation model tests.

3. Results

3.1. Descriptive statistics and correlation

Table 1 Shows the means and standard deviation of EI, PA, NA, and aggressive behavior. After applying Bonferroni's Correction [49], the adjusted significance level was set at $p < 0.0083$ (0.05/6), and the correlation coefficients between the variables (Table 1) were found to still be significant. EI and PA were positively correlated ($r = 0.50$, $p < 0.0083$). NA was positively correlated with aggressive behavior ($r = 0.48$, $p < 0.0083$). EI was negatively correlated with NA ($r = -0.56$, $p < 0.0083$) and aggressive behavior ($r = -0.40$, $p < 0.0083$). There was also a negative correlation between PA with NA ($r = -0.48$, $p < 0.01$) and between PA with aggressive behavior ($r = -0.25$, $p < 0.0083$).

3.2. Test the mediation model

The sequential mediation model was tested using spss22.0, and the standard fit indices for each pathway are shown in Fig. 2, Table 2 and Table 3. Firstly, children EI was positively related to PA ($\beta = 0.43$, $p < 0.001$), which in turn was not significantly associated with aggressive behavior ($\beta = 0.04$, $p > 0.05$), thus the mediating effect of PA is not significant ($\beta = 0.02$, $p > 0.05$, 95% $CI = [-0.03, 0.06]$). Secondly, EI was negatively associated with NA ($\beta = -0.30$, $p < 0.001$), which in turn was positively associated with aggressive behavior ($\beta = 0.37$, $p < 0.001$), thus the mediating effect of NA is significant ($\beta = -0.11$, $p < 0.001$, 95% $CI = [-0.16, -0.07]$). Finally, PA was negatively associated with NA ($\beta = -0.22$, $p < 0.001$), and the sequential mediating effect of PA and NA between EI and aggressive behavior was also significant ($\beta = -0.04$, $p < 0.01$, 95% $CI = [-0.07, -0.01]$). Therefore, test results of the sequential mediation model support hypothesis 2 and 3 but do not support hypothesis 1.

4. Discussion

This study aimed to test the associations among EI, PS, NA, and aggressive behavior in children. We found that NA mediates the negative association between EI and aggressive behavior. Also, EI is negatively associated with aggressive behavior through the chain mediation mechanism of PA and NA.

Table 1
Descriptive statistics and correlations for all variables.

Variable	1	2	3	4	5
Gender	–				
EI	0.09	–			
PA	−0.01	0.50[a]	–		
NA	−0.05	−0.56[a]	−0.48[a]	–	
Aggressive behavior	0.12*	−0.40[a]	−0.25[a]	0.48[a]	–
M		6.03	4.24	1.52	1.69
SD		1.17	0.99	0.81	0.77

Note: $N = 410$, Gender is a dummy variable, female = 0, male = 1. [a] Correlations coefficients that are significant after applying Bonferroni's Correction, $p < 0.0083$.

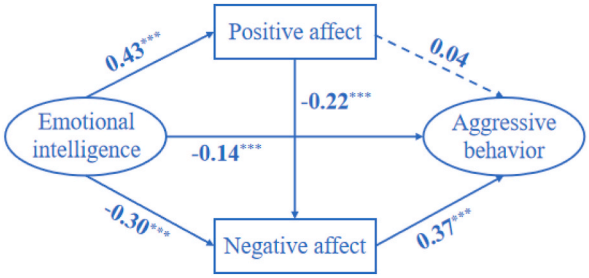

Fig. 2. The final model. Note: *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 2
The mediation model.

Outcome variable	Prediction variable	*R*	R^2	*F*	*β*	*LLCI*	*ULCI*	*t*
PA	Gender	0.50	0.25	45.91***	−0.11	−0.26	0.06	−1.25
	Age				−0.04	−0.23	0.14	−0.45
	EI				0.43***	0.36	0.50	11.73
NA	Gender	0.61	0.37	59.10***	−0.01	0.83	−0.14	−0.21
	Age				−0.01	−0.15	0.13	−0.14
	EI				−0.30***	−0.36	−0.24	−9.29
	PA				−0.22***	−0.29	−0.15	−5.84
Aggressive behavior	Gender	0.53	0.28	31.89***	0.24***	0.37	0.10	3.41
	Age				0.02	−0.12	0.15	0.21
	EI				−0.14***	−0.21	−0.07	−4.05
	PA				0.04	−0.04	0.12	1.05
	NA				0.37***	0.27	0.47	7.43

Note: $N = 410$. *LLCI* = lower limit of the 95% confidence interval, *ULCI* = upper limit of the 95% confidence interval. *$p < 0.05$, **$p < 0.01$, ***$p < 0.001$.

Table 3
Testing the pathways of the model.

Effect	Path	*β*	*SE*	*LLCI*	*ULCI*
Direct effect	EI → Aggressive behavior	−0.14	0.04	−0.21	−0.07
Mediating effect	EI → PA → Aggressive behavior	0.02	0.02	−0.03	0.06
	EI → NA→ Aggressive behavior	−0.11	0.02	−0.16	−0.07
	EI → PA → NA → Aggressive behavior	−0.04	0.01	−0.07	−0.01
Total effect		−0.27	0.03	−0.33	−0.21

4.1. Mediating role of negative affect

Negative affect plays an important role in many maladaptive behaviors, including aggressive behavior. Emotional intelligence is one factor that could significantly influence the general negative affect. The current study suggests that children who reported lower EI also reported higher levels of NA and higher levels of aggressive behavior. This finding further demonstrates the applicability of GAM in explaining how EI influences children's aggressive behavior. The inadequacy of an individual ability to understand and perceive emotions (phase 1 of GAM) may produce high levels of negative affect (phase 2 of GAM) and aggressive behavior (phase 3 of GAM) [11].

Specifically, children with lower levels of EI are more vulnerable to life stressors, leading to an increased experience of NA, such as depression and anxiety [53,54]. Moreover, our research delves into the relationship between EI and problem behavior among children. According to the emotion regulation theory, NA triggers emotional regulation motivation [55], prompting individuals to regulate their current emotional state. While being maladaptive, aggressive behavior can be used as a way to achieve desired emotional state [56]. This finding emphasizes the need for interventions targeting EI enhancement among children, as it holds the potential to foster healthier emotional expression and adaptive coping strategies. Implementing EI training programs in educational settings and providing support in emotional regulation may prove instrumental in reducing aggressive behavior among children [57].

4.2. Mediating role of positive affect

Although EI was positively associated with PA in our study, PA did not mediate the link between EI and aggressive behavior. This result is an important amendment to the GAM theory in that maybe aggressive behavior is determined by the interaction of some but

not all personal factors and affect states.

For example, EI levels can positively predict academic achievement. Students with higher EI tend to possess a strong sense of academic self-efficacy, which is associated with improved academic performance [58,59]. As a result of their academic success, students experience PA such as joy, pride, and relaxation, contributing to their overall well-being and motivation to excel academically [60]. Moreover, EI can help children maintain better interpersonal relations and gain more social support [61]. demonstrated that EI facilitates better interpersonal communication and conflict resolution skills. This ability enables children to foster positive relationships with peers, leading to increased social support and subjective well-being [62]; Zhang et al., 2018). However, PA did not significantly mediate the relation between EI and aggressive behaviors in our study. This suggests that other factors, such as cognitive processes and emotional regulation, might be involved in shaping aggressive behavior in children [63].

4.3. Multiple mediating effects of positive affect and negative affect

Our third hypothesis found that EI is negatively associated with aggressive behavior through the chain mediation of PA and NA. This finding reveals a more comprehensive process when children experience PA, it has profound effects on their cognitive and behavioral processes [64]. PA enhances cognitive flexibility and creativity [60,65]. This emotional state facilitates problem-solving abilities and fosters a constructive approach to challenges. As a result, children are more likely to adopt efficient actions and make better decisions, reducing the likelihood of aggressive responses [66].

Specifically, previous research has demonstrated that experiencing positive emotions can mitigate the adverse effects of negative emotions, leading to increased emotional resilience [67,68]. Emotional resilience enables children to cope effectively with stressors and conflicts, thus reducing the likelihood of aggressive behavior [69]. Furthermore, our findings support the broaden-and-build theory, which suggests that positive emotions broaden individuals' thought-action repertoires and build personal resources [70]. In the context of EI, PA can serve as a catalyst for the development of adaptive strategies in children. These strategies, such as emotional regulation and empathy, are crucial for navigating social interactions and managing conflicts in a non-aggressive manner [71,72].

In short, children with higher EI levels could better understand themselves and others' thinking, emotion, and motivation correctly.

They can utilize adaptive strategies to cope with challenges arise in daily life, avoid aggressive thoughts and behaviors, and enjoy rewarding social relationships. Moreover, children with high levels of EI have more resources in their toolbox to deal with negative emotions incurred by life stressors without taking aggressive actions.

4.4. Limitations and future research

While the findings are significant, the current study has the following limitations. Firstly, there are two subcategories of aggression: reactive aggression (i.e., in response to threats or provocations) and proactive aggression [11]. Compared to proactive aggression, reactive aggression has been shown more closely related to low levels or a lack of PA [73,74]. Therefore, future studies could examine reactive and proactive aggression separately to further explore the relationship between children's emotions and different types of aggressive behaviors Secondly, although we proposed the mediation model based on the theoretical foundation and empirical evidence, the cross–sectional design is hard to infer causality. Therefore, future research could adopt other research methods such as experimental design or qualitative interviews to better test the causality that has been suggested in our model. Thirdly, this study primarily collected data from children's self–report questionnaires. While self-report data benefits from convenient observation opportunities, it might present a biased view from other-report data. Therefore, Future studies will benefit from collecting data from multiple samples including teachers, parents, and peers. Finally, Finally, the validity and reliability of the EI, PA, and NA scales used in this study for Chinese children need further verification. In future empirical research, it is recommended to employ scales that are appropriate for the participants' age group to ensure more accurate and reliable measurements.

4.5. Practical implications

The current study provides some new ideas for the intervention of aggressive behavior in children. Firstly, this study shows that ei is an important protective factor of children's aggression, and childhood is a critical period for individual EI cultivation [75], so both families and schools should pay attention to the development of children's EI. Parents can adopt a democratic and authoritative parenting style and give children positive feedback in a timely manner to create a family atmosphere that encourages communication when conflicts arise. Teachers should show respect and care for students to enhance their emotional connection and improve children's emotional expression skills [76]. Educators can help children improve their ability to understand and manage emotions through EI training courses specifically designed for children [77,78]. Secondly, emotional problems are the most prominent stressors for primary- and secondary-school students [79]. Our study also confirms the significance of negative emotions in children's EI and aggressive behavior. Therefore, both teachers and parents should pay more attention to children who show high levels of negative emotions in their daily lives. For example, mindfulness training can be used to reduce children's negative emotions and improve their mental health [80–83], thereby reducing the occurrence of aggressive behavior in children. Finally, as multiple mediators link EI to aggressive behavior, interventions designed to simultaneously enhance PA and reduce NA may be more effective than interventions that aimed to affect only positive emotions or negative emotions.

5. Conclusion

In brief, the present study took an important step in exploring the mediating mechanisms through which emotional intelligence is associated with children's aggressive behavior. It showed that PA and NA could sequentially mediate the relation between EI and children's aggressive behavior. These findings would advance our understanding of the mediating pathways between emotional intelligence and aggressive behavior, helping to recognize the significance of emotional factors in shaping behavior and promoting healthier emotional expression and conflict resolution strategies among children.

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Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

Patients signed informed consent regarding publishing their data and photographs.

Ethics approval

Approval was obtained from the ethics committee of Shenzhen University (the ethical approval number is PN – 202300047).

Author contribution statement

Qiufeng Gao; Wenyi Tang: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Yuncui Yang: Conceived and designed the experiments; Performed the experiments.

En Fu: Conceived and designed the experiments; Wrote the paper.

Data availability statement

Data will be made available on request.

Additional information

No additional information is available for this paper.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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