



# Parental attachment and depression in adolescents: Moderation mediation model of empathy and gender

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## Abstract

Previous studies have demonstrated that poor quality of parental attachment and low levels of empathy are associated with adolescent's depressive symptoms. However, the relationships between parental attachment, empathy and depressive symptoms and how they differ by gender remain unclear. The present study aimed to clarify the distinct associations among both paternal and maternal attachments and depressive symptoms via cognitive empathy and affective empathy and whether the pathways were different for adolescent males and females. A sample of 374 Chinese adolescents participated in the survey and completed scales of parental attachments, depressive symptoms and empathy. Results revealed affective empathy partially mediated the relationship between maternal attachment and depressive symptoms and cognitive empathy did not emerge as a significant mediator. Gender showed moderating effects on associations among parental attachments, empathy and depressive symptoms. Specifically, paternal attachment was only significantly associated with affective empathy in adolescent males, while adolescent females showed significant associations between maternal attachment and affective empathy, and the pathway from paternal attachment, cognitive empathy/affective empathy to depressive symptoms. The findings indicate there are multiple pathways from parental attachments to depressive symptoms in adolescents, and gender plays an important moderating role.

**Keywords** Parental attachment · Depressive symptoms · Empathy · Gender

## Introduction

Depression is a public health concern that is associated with significant functional impairments, including deficits in cognitive functions, educational and academic difficulties, and in more severe cases, with heightened suicide risk (Owens et al., 2012; Thapar et al., 2012). Depression is the leading cause of disability globally, with a lifetime prevalence of 10.8% (Lim et al., 2018). Although depression is prevalent throughout the lifespan, adolescents in particular appear to be disproportionately affected. It is estimated that 16.7% of Chinese

adolescents suffer from depressive symptoms (Zhou et al., 2018), and females are at a higher risk than males (Hesketh & Ding, 2005). Depressive symptoms refer to symptoms of depression that may exist with or without a diagnosis of major depressive disorder (Dekker et al., 2011). There are some typical symptoms of depression, such as low mood, loss of interest, guilt or worthlessness, and death wishes (Zimmerman et al., 2010). Previous studies have examined how Chinese parents influence the onset of depression in their adolescent children. For example, some studies have examined the effect of perceived parental pressure to perform academically on

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adolescent's depressive symptoms (Quach et al., 2015; Hesketh et al., 2010), while other studies have examined the effect of low-level parental attachment on depression (Chen et al., 2019). However, despite previous research efforts elucidating predictors of adolescent depression, the etiology and mechanisms are still unclear (Gong et al., 2020). Given the high prevalence and the severity of depressive symptoms among Chinese adolescents, it is of great importance to study the developmental psychopathology of depression.

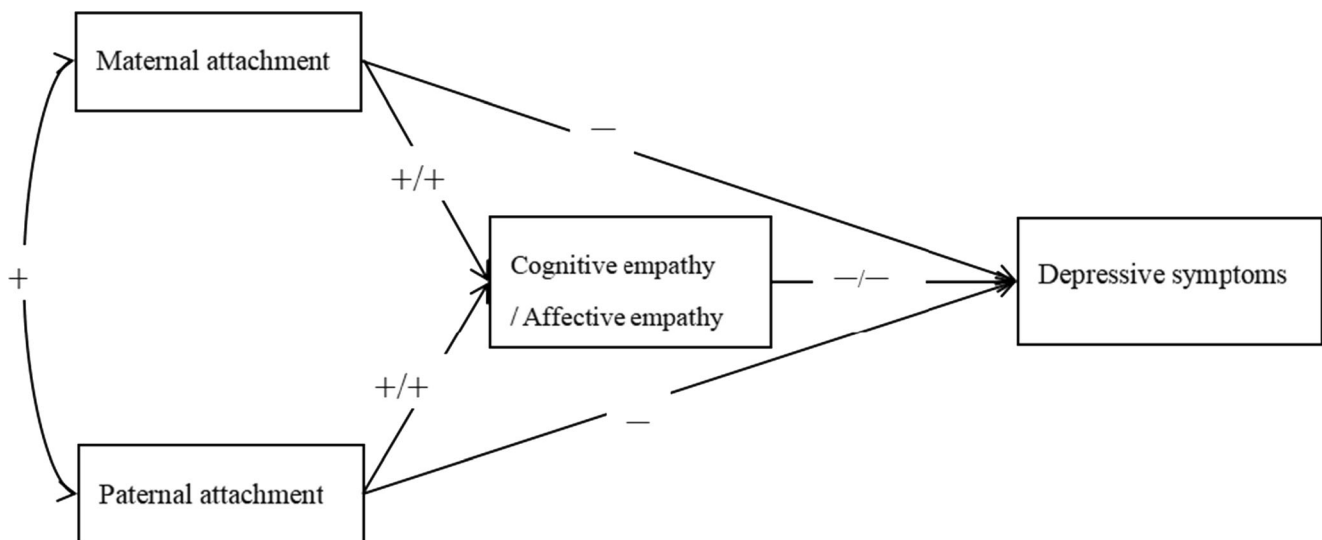
According to previous studies, adolescents with poor quality of parental attachment are at greater risk for depression (Cassidy, 1994; Chen et al., 2019; Kullik & Petermann, 2013; Morley & Moran, 2011). Parental attachment was defined as children's affectional bond with parents (Bowlby, 1969). Adolescents with lower levels of parental attachment experienced higher levels of depressive symptoms over time, and changes in attachment security were linked to changes in depressive symptoms (Khan et al., 2019). A prior study also demonstrated that low levels of maternal and paternal attachment were both significantly associated with higher levels of depression among adolescents (Chen et al., 2019). Moreover, maternal and paternal attachment showed distinct trajectories of depressive symptoms among adolescents (Duchesne & Ratelle, 2014; Chen et al., 2019). Specifically, as proposed by Duchesne and Ratelle (2014), compared to paternal attachment, child's attachment security from mother increased the odds of being categorized into the trajectory groups characterized by moderate stable and moderate increasing depressive symptoms. However, results from different samples suggest otherwise. In a recent study with a large Chinese adolescent sample, both paternal attachment and maternal attachment were related to less depressive symptoms, but paternal attachment showed a slightly stronger direct association with depressive symptoms than maternal attachment (Chen et al., 2019). These discrepancies and heterogeneous results between parent attachment and adolescent's depressive symptoms warrant the need for further studies to clarify the differential roles of parental attachments in the development of depressive symptoms among Chinese adolescents.

Recent studies have also demonstrated the mediating effects of empathy on the associations between attachment and depressive symptoms (Burnette et al., 2009). Empathy is defined by the capacity to understand others, to feel others' emotions and to respond others' suffering with concern and kindness (Stern & Cassidy, 2018). As indicated by previous study, children who have low quality of parental attachment tend to develop insecure working models of relationships (Cassidy, 1994), which may increase their risk of utilizing avoidant strategies in dealing with problems in relationships. According to Burnette et al. (2009), students with a high level of avoidant attachment use strategies to seek psychological and physical distance, which may hinder their ability to empathize with others in times of threat and in turn reduces their levels of depression (Burnette et al., 2009).

However, contrary to Burnette et al. (2009), Wei et al. (2011) found that students with higher avoidant attachment may express less empathy towards others, which in turn decreases their positive emotions. Given these heterogeneous findings, the nature of the relationship between empathy and depression remain unclear. Moreover, Burnette et al. (2009) did not differentiate between cognitive and affective empathy, which were followed by different processes. Cognitive empathy is linked to the ability to understand and predict others' mental states, while affective empathy refers to the ability to detect and experience others' emotions (Maurage et al., 2011). Wei et al. (2011) only examined the mediating role of affective empathy on the relationship between attachment and happiness. Consequently, these two components of empathy may manifest themselves differently in social interactions.

Although no studies to date have examined the mediating role of cognitive and affective empathy on parental attachment and depressive symptoms, a few studies have examined empathy-depression and empathy-attachment relationships independently. As indicated by attachment theory, individuals with higher quality of parental attachment are more likely to modulate their emotional reactions and experience empathy in general (Eisenberg & Fabes, 2006). Regarding two types of empathy, a previous study has found that high quality of attachment is more associated with higher levels of cognitive empathy instead of affective empathy, while poor quality of attachment is linked to lower levels of affective empathy (Troyer & Greitemeyer, 2018). Moreover, the study also demonstrated individuals with high quality of attachment reappraised their emotions more frequently and in turn promoted their experience of cognitive empathy, while individuals with poor quality of attachment suppressed their emotions more often and in turn inhibited their expression of affective empathy (Troyer & Greitemeyer, 2018).

For the relations between empathy and depressive symptoms, previous studies found inconsistent results. Cognitive empathy was negatively associated with depressive symptoms, while affective empathy was positively related to depressive symptoms (Bennik et al., 2019; Gambin & Sharp, 2018). Yet, affective empathy was also negatively correlated with depression in some studies (De Li et al., 2020; Ghorbani et al., 2003). Regarding these mixed results, the different mechanisms of cognitive empathy and affective empathy relating to depression might play an important role. Tone and Tully (2014) proposed the risky empathy developmental model to try and elucidate these different mechanisms. The model suggested that maladaptive cognitive empathy tends to develop irrational beliefs, such as forcing oneself the responsibility of lessening pain for others, leading to feelings of guilt and possible depressive symptoms (Tone & Tully, 2014; Zahn-Waxler & Van Hulle, 2012). On the other hand, unreasonable expression of affective empathy might evoke personal distress as a kind of self-oriented negative response, (Tone & Tully, 2014; Zahn-Waxler & Van Hulle, 2012), which



**Fig. 1** The proposed theoretical model of parental attachment and adolescent depressive symptoms

was positively associated with depression in a previous study (Lee, 2009). Therefore, although maladaptive cognitive empathy and affective empathy may both lead to depression, the different processes separate the two types of empathy from having the same pathways.

The different underlying processes associated with affective and cognitive empathy are associated with different emotional responses. For example, as described by Tone and Tully (2014), affective empathy, often termed empathic concern, leads to the compassionate responses to other's emotional states (Davis et al., 1994; Shamay-Tsoory et al., 2009). Although personal distress is a maladaptive affective response to negative emotions in others (Tone & Tully, 2014), empathic concern is preferred in the assessment of one's levels of affective empathy. Previous studies have found inconsistent links between empathic concerns and depression (De Li et al., 2020; Ghorbani et al., 2003; Huang et al., 2020; Lee, 2009; O'Connor et al., 2002). In some studies, empathic concern was negatively related to depression (De Li et al., 2020; Ghorbani et al., 2003), while in other studies empathic concern was positively related (Huang et al., 2020) or was unrelated to depression (Lee, 2009; O'Connor et al., 2002).

Previous studies have taken empathic concern as a measurement of affective empathy and perspective taking as a measurement of cognitive empathy (Van Lissa et al., 2014a; Van Lissa et al., 2014b; Winters et al., 2020). Given these distinctions of cognitive empathy and affective empathy, it is important to acknowledge that the effects of cognitive and affective empathy might be different on the associations between attachment and depressive symptoms. By confirming empathy-depression and empathy-attachment relationships, these studies support a basis for empathy serving a mediating role between depression and attachment. Therefore, the current study sought to contribute to this literature by

examining the differential effects of cognitive and affective empathy on the associations between parental attachment and depressive symptoms. As proposed by Tone and Tully (2014) who considered empathic concern as an adaptive form of affective empathy, we expected higher levels of empathic concern to be related with fewer depressive symptoms.

When considering the pathways between parental attachments, depressive symptoms, and empathy, there are reasons to suspect that these pathways might differ for males and females. Gender has been frequently associated with depression and empathy, accumulating evidence that gender is a moderating factor in their relationship. Existing data consistently suggest females have a higher risk of developing depression (Lim et al., 2018; Sevick et al., 2000), particularly during adolescent years (Kouros & Garber, 2014). The prevalence of depression for females (14.4%) is higher than males (11.5%) (Lim et al., 2018). Previous studies have also demonstrated the importance of gender differences in empathy (Schwenck et al., 2014). Yet again, incongruence in previous findings on gender differences in empathy remain (Jolliffe & Farrington, 2006; Li et al., 2018; Schwenck et al., 2014). Theories of social perception and gender stereotypes indicate that females tend to have higher levels of empathy than males (Eisenberg & Lennon, 1983), and these have been supported in several studies (see Huang & Su, 2014; Li et al., 2018). Moreover, Jolliffe and Farrington (2006) found girls scored significantly higher than boys on affective, cognitive, and total empathy, but the disparity between boys and girls was greater for affective empathy than for cognitive empathy. However, some previous studies also indicated females demonstrated better cognitive empathy compared to males. These gender differences tended to be rather small, and there appeared to be no gender differences in affective empathy (Schwenck et al., 2014). Collectively, these mixed results dictate the necessity of examining the moderating effect of gender on the distinct

**Table 1** Demographics and Main Study Variables for the Total, Male and Female Samples

		Total sample			Males			Females		
		% or <i>M</i>	<i>SD</i>	<i>n</i>	% or <i>M</i>	<i>SD</i>	<i>n</i>	% or <i>M</i>	<i>SD</i>	<i>n</i>
Background information	Missing (%)									
Boy	0	39.3%		147		–			–	
Girl	0	60.7%		227		–			–	
Age	2.1	13.93	2.10		13.76	1.99	143	14.04	2.16	223
Mother's age	18.2	39.91	5.23	306	39.45	5.22	116	40.18	5.23	190
Father's age	20.0	41.72	5.34	299	41.27	5.23	115	42.01	5.41	184
Monthly income	5.3	2.74	0.76	354	2.86	0.72	140	2.66	0.77	214
Observed variables										
Maternal attachment	2.1	23.69	12.57	366	24.05	12.28	144	23.46	12.78	222
Paternal attachment	7.2	20.81	13.72	347	21.80	12.88	132	20.20	14.20	215
Depressive symptoms	1.8	4.25	4.33	367	4.36	4.29	143	4.17	4.36	224
Cognitive empathy	3.2	13.30	4.65	362	13.23	5.05	142	13.34	4.38	220
Affective empathy	2.7	17.43	3.81	364	16.87	3.96	142	17.80	3.67	222

relations among cognitive and affective empathy with attachment and depressive symptoms.

In summary, exploring mechanisms of depression among adolescents will yield better understanding for prevention and treatment development. Our current study had two keys aims: 1) to examine the distinct mediating role of cognitive and affective empathy on the association between parental attachments (including maternal and paternal attachment) and depressive symptoms; 2) to examine if gender moderated the mediation pathway from parental attachments to empathy and depressive symptoms among Chinese adolescents (see hypothesized model, Fig. 1). We hypothesized that the maternal (vs. paternal) attachment would have stronger associations with both empathy and depressive symptoms. As indicated by Burnette et al. (2009), we hypothesized that empathy would serve as a mediator between parental attachments and depressive symptoms.

Considering previous studies have found that attachment positively related to empathy, we hypothesized that parental attachment (including maternal and paternal attachment) would positively associate with empathy as well (Burnette et al., 2009). Given the findings regarding the relations among cognitive empathy, affective empathy, and depressive symptoms (Bennik et al., 2019; De Li et al., 2020; Ghorbani et al., 2003), we hypothesized that both cognitive empathy and affective empathy would be negatively associated with adolescent depressive symptoms. As we mentioned above, the second aim was to examine gender differences in the paths from parental attachments to empathy and depressive symptoms among Chinese adolescents. We expected these paths and relations to be more robust among females than males. The theoretical model is shown in Fig. 1.

## Methods

### Participant and Study Procedure

The participants included 374 adolescents (39.3% male) from three primary schools (students from fifth and sixth grades) and five high schools (students in seventh and eighth grades) in Mainland China. Their ages ranged from 10 to 18 years ( $M_{\text{age}} = 13.93$ ,  $SD_{\text{age}} = 2.10$ ). Participants and their parents received information about the current study from their master teachers, and informed consents were obtained. Rating scales were completed by participants during breaks between classes. Students were also asked to evaluate the monthly income of their families on a 5-point scale, from very high to very low. Both age and family income were entered in the models as covariates. Further information of demographics and main variables on the overall sample and gender samples can be found in Table 1.

### Measures

#### Parental Attachment

The Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987; Chinese revised version: Jin et al., 2010) was used to assess the quality of attachment between adolescents and their parents. The revised Chinese IPPA include two subscales (each with 15 items) that measure attachment to mother and father separately. Participants were asked to evaluate the degree of mutual trust (five items; e. g., “My father/mother respects my feelings”), quality of

communication (five items; e. g., “If my father/mother know something is bothering me, they ask me about it.”), and extent of anger and alienation (five items; e.g., “I feel angry with my father/mother”). Participants rated IPPA on a 5-point Likert scale (1 = *very untrue* to 5 = *very true*) and higher total scores indicate higher levels of parental attachment. The Cronbach’s  $\alpha$  was 0.91 for both mother and father attachment scales in the current study.

### Depressive Symptoms

The Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995; Chinese revised version: Gong et al., 2010) is a 21-item self-report scale that measures the degree of depression, anxiety, and stress in the previous week, consisting of seven items per subscale. In this study we only used the depression subscale in order to assess adolescent ratings of depressive symptoms. Items in the depression subscale (e. g., “Over the past week, I felt sad and depressed”) were rated on a 4-point Likert scale (0 = *does not apply to me at all* to 3 = *applies to me very much or most of the time*). Higher scores indicate higher levels of depressive symptoms, and the depression subscale had good internal consistency ( $\alpha = 0.86$ ) in the current study.

### Empathy

The Interpersonal Reactivity Index (IRI; Davis, 1983; Chinese revised version: Zhang et al., 2010) was used to measure the level of empathy. The subscale of empathic concern (six items; e. g., “I am often quite touched by things that I see happen”) was used to assess affective empathy and the subscale of perspective taking (five items; e. g., “I believe that there are two sides to every question and I try to look at them both”) was used to assess cognitive empathy. Participants responded to items on a 5-point Likert scale (1 = *strongly disagree* to 5 = *strongly agree*) and higher scores indicated better empathy. The internal reliability for affective empathy and cognitive empathy was 0.53 and 0.87, respectively. Given the original Cronbach’s  $\alpha$  of the revised Chinese version of empathic concern was 0.53 (Zhang et al., 2010), the reliability in the current study was low but similar as in the previous study.

### Data Analyses

Data were primarily analyzed by IBM SPSS 21.0 for results of demographic characteristics. Preliminary analyses were conducted to examine whether the data were missing completely at random (MCAR). Little’s (1988) MCAR test for all variables (such as the total scores of parental attachment, empathy and so on) within the sample of 374 was conducted and the result was not significant ( $\chi^2[177] = 189.92, p = 0.24$ ),

indicating that missing data was completely at random. The missing percentages of all variables had been listed in Table 1. The full information maximum likelihood (FIML) function was applied to replace missing data within the described parameters. Internal consistency ratings and correlations among the variables were performed after primary descriptive analyses. We then used Mplus 7.4 (Muthén & Muthén, 1998–2015) to examine the pathways among variables of interest. In particular, we used structural equation modeling (SEM) to examine the mediating effects of empathy and the moderating effects of gender. The model fit indices of SEM are shown in Table 3. We adopted the suggested cutoff criteria for a good fit as follows: comparative fit index (CFI)  $\geq 0.90$ , the root mean square error of approximation (RMSEA)  $\leq 0.08$ , and the standardized root mean squared residual (SRMR)  $\leq 0.08$  (Byrne, 2010; Hu & Bentler, 1999).

## Results

### Descriptive and Intercorrelations for all Variables of Interest

Descriptive statistics for the total sample are provided in Table 1. Maternal attachment ( $M = 23.69, SD = 12.57$  for total sample), paternal attachment ( $M = 20.81, SD = 13.72$  for total sample), depressive symptoms ( $M = 4.25, SD = 4.33$  for total sample), cognitive empathy ( $M = 13.30, SD = 4.65$  for total sample) and affective empathy ( $M = 17.43, SD = 3.81$  for total sample) were measured in the current study. The affective empathy scores for males were significantly lower than those of females ( $t = -2.29, p < 0.05$ ). There were no significant gender differences for maternal attachment ( $t = 0.44, p = 0.66$ ), paternal attachment ( $t = 1.05, p = 0.29$ ), depressive symptoms ( $t = 0.42, p = 0.68$ ) and cognitive empathy ( $t = -0.21, p = 0.84$ ).

Correlation analyses are displayed in Table 2. The correlations among variables of interest were significant in both the total sample and in the male sample. Adolescents who reported higher levels of attachment to their parents reported higher empathy (both cognitive and affective empathy) and lower levels of depressive symptoms. For females, however, the correlation between cognitive empathy and depression was not significant. These gender differences suggest that cognitive empathy is only associated with depression in males. Gender difference was further examined by multiple group analysis.

### The Mediating Effects of Empathy

In order to examine the distinct mediating role of cognitive and affective empathy on the associations between parental attachment and depressive symptoms, SEM models were first

**Table 2** Correlations among the Variables for the Total, Boy and Girl samples

	1 Maternal attachment	2 Paternal attachment	3 Depressive symptoms	4 Cognitive empathy	5 Affective empathy
Total sample					
1	1.00	0.64**	-0.47**	0.24**	0.23**
2		1.00	-0.32**	0.27**	0.21**
3			1.00	-0.15**	-0.25**
4				1.00	0.33**
Males					
1	1.00	0.68**	-0.46**	0.26**	0.30**
2		1.00	-0.40**	0.27**	0.36**
3			1.00	-0.19*	-0.26**
4				1.00	0.34**
Females					
1	1.00	0.61**	-0.47**	0.22**	0.19**
2		1.00	-0.28**	0.28**	0.14*
3			1.00	-0.12	-0.24**
4				1.00	0.32**

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)

used to examine the hypothetical model in Fig. 1 for total sample. As presented in Fig. 2 and Table 3, the models of total sample met the criteria for a good model fit.

For cognitive empathy model, the direct effect of maternal attachment on adolescent’s depressive symptoms was significant ( $\beta = -0.43$ ,  $SE = 0.07$ ,  $p < 0.001$ ), while the direct effect of paternal attachment was not significant ( $\beta = -0.03$ ,  $SE = 0.07$ ,  $p = 0.666$ ). Paternal attachment was significantly related to cognitive empathy ( $\beta = 0.20$ ,  $SE = 0.07$ ,  $p < 0.01$ ). The results indicate that adolescents with higher levels of maternal attachment reported more depressive symptoms, and adolescents with higher levels of paternal attachment showed higher levels in cognitive empathy. Bias-corrected bootstrap confidence intervals (CIs) were used to test indirect effects. Cognitive empathy did not emerge as a significant mediator between parental attachment and depressive symptoms (i.e., all bootstrapped 95% CI’s contained 0).

**Table 3** Indexes of the model fit for mediation models of cognitive empathy

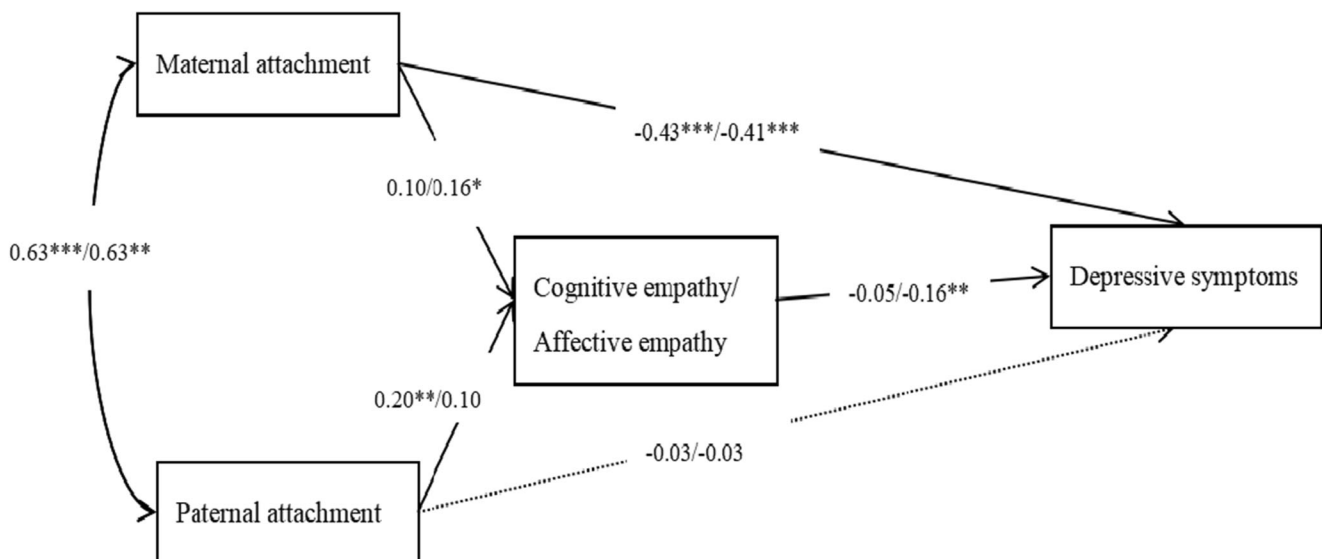
Model	$\chi^2$ (df)	CFI	RMSEA	SRMR	p
1. Parental attachment -cognitive empathy-depressive symptoms (whole sample)	5.49(5)	0.995	0.016	0.019	0.359
2. Parental attachment -affective empathy-depressive symptoms (whole sample)	8.30(5)	0.971	0.042	0.021	0.141

For affective empathy model, the direct effect of maternal attachment on adolescent’s depressive symptoms were significant ( $\beta = -0.41$ ,  $SE = 0.07$ ,  $p < 0.001$ ), while paternal attachment showed no significant effect on depressive symptoms ( $\beta = -0.03$ ,  $SE = 0.07$ ,  $p = 0.714$ ). Affective empathy predicted depressive symptoms ( $\beta = -0.16$ ,  $SE = 0.05$ ,  $p < 0.01$ ). The indirect effect of affective empathy on maternal attachment via depressive symptoms was significant (IE =  $-0.025$ , 95% CI [ $-0.058$ ,  $-0.002$ ]), indicating that affective empathy mediates the relationship between maternal attachment and depressive symptoms. The results suggest that adolescents with higher levels of maternal attachment expressed more affective empathy for others which in turn was associated with fewer depressive symptoms.

However, paternal attachment had no significant relation with affective empathy ( $\beta = 0.10$ ,  $SE = 0.07$ ,  $p = 0.13$ ) and depressive symptoms ( $\beta = -0.03$ ,  $SE = 0.07$ ,  $p = 0.71$ ). The mediating effect of affective empathy on the association between parental attachments and depressive symptoms was not significant (i.e., all bootstrapped 95% CI’s contained 0).

**The Moderating Effect of Gender**

According to the model results of males and females in Table 4, the model fit indexes were acceptable, therefore we then performed multiple group analysis for identifying gender differences between models. Models of the mediation role of cognitive and affective empathy were identified separately across males and females. We compared the unconstrained (all the parameters among parental attachments, empathy



**Fig. 2** Model of empathy as mediating the association between parental attachments and depressive symptoms. Standardized coefficients are shown. All paths shown in Fig. 1 were included. Significant paths ( $*p < 0.05$ ;  $**p < 0.01$ ;  $***p < 0.001$ ) are depicted with a solid line and

nonsignificant paths are shown with a dotted line. When two values are assigned to a path, the first refers to cognitive empathy and the second to affective empathy

and depressive symptoms were allowed to vary freely across males and females) and fully constrained (all the parameters among parental attachments, empathy and depressive symptoms were constrained to be equal across males and females) models to confirm whether the models were moderated by gender.

For the models with cognitive empathy (model 3 and 4), the result of multiple group analysis showed that the two models were significantly different across males and females,  $\Delta\chi^2(9) = 65.98, p < 0.001$ . As presented in Fig. 3, compare to the significant associations between paternal attachment and cognitive empathy in females ( $\beta = 0.23, SE = 0.09, p < 0.01$ ), paternal attachment showed no significant direct associations with cognitive empathy in males ( $\beta = 0.17, SE = 0.12, p = 0.171$ ). The results indicate that adolescents with higher levels

of paternal attachment reported higher scores on cognitive empathy compared to adolescents with lower levels of maternal attachment in females.

As examined by multiple group analysis, the two models of affective empathy (model 5 and 6) were also significantly different across males and females,  $\Delta\chi^2(9) = 73.38, p < 0.001$ . As presented in Fig. 4, compared to males, maternal attachment was significantly related to affective empathy ( $\beta = 0.18, SE = 0.09, p < 0.05$ ), and affective empathy was negatively associated with depressive symptoms in females ( $\beta = -0.16, SE = 0.06, p < 0.05$ ). The results indicate that adolescents with higher levels of maternal attachment reported higher scores on affective empathy and lower scores on depressive symptoms compared to adolescents with lower levels of maternal attachment in females.

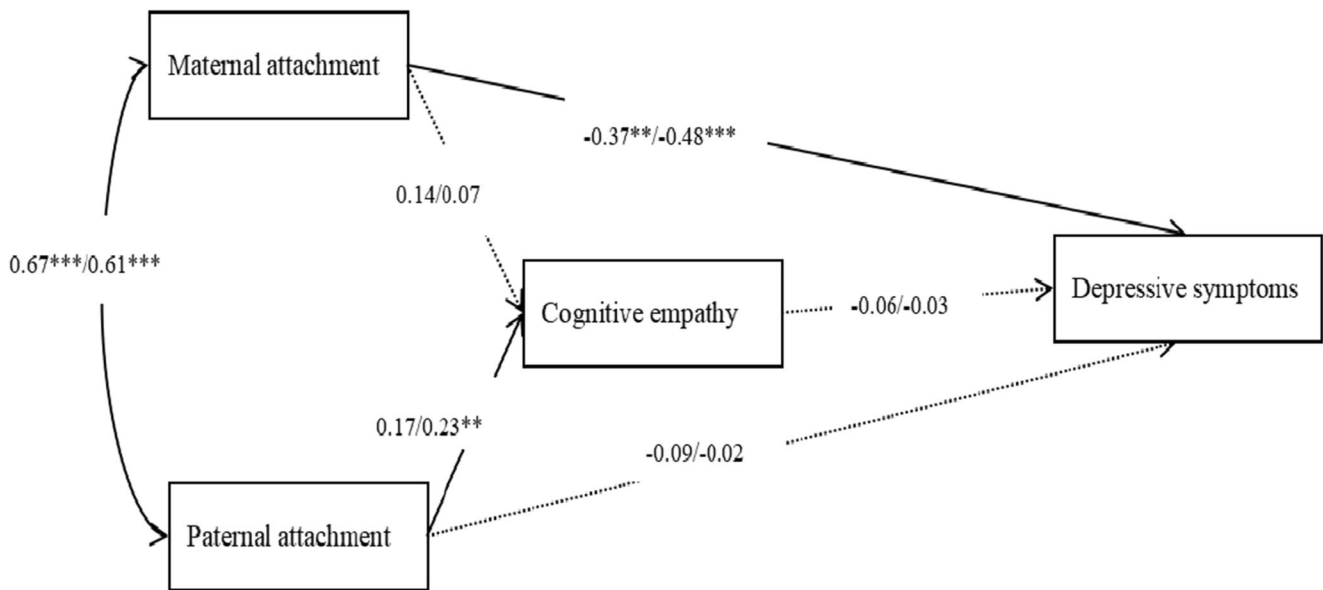
However, the mediation effect of affective empathy on the association between attachments and depressive symptoms were not significant in both males and females (all bootstrapped 95% CI's contained 0). Additionally, paternal attachment was only significantly related to affective empathy in males ( $\beta = 0.27, SE = 0.12, p < 0.05$ ).

**Table 4** Indexes of the model fit for mediation models in the male and female sample

Model	$\chi^2(df)$	CFI	RMSEA	SRMR	$p$
3. Parental attachment -cognitive empathy-depressive symptoms (males)	6.34(4)	0.951	0.063	0.022	0.175
4. Parental attachment -cognitive empathy-depressive symptoms (females)	9.55(4)	0.920	0.078	0.037	0.187
5. Parental attachment -affective empathy-depressive symptoms (males)	1.18(4)	1.000	0.000	0.013	0.882
6. Parental attachment -affective empathy-depressive symptoms (females)	2.86(4)	1.000	0.000	0.018	0.582

## Discussion

The present study adds to the existing literature of adolescent depression by highlighting the effects of parental attachment on depression via cognitive and affective empathy and how they vary by gender. Specifically, we expanded on the studies of Burnette et al. (2009) and Wei et al. (2011) by examining the distinct roles of cognitive and affective empathy in the



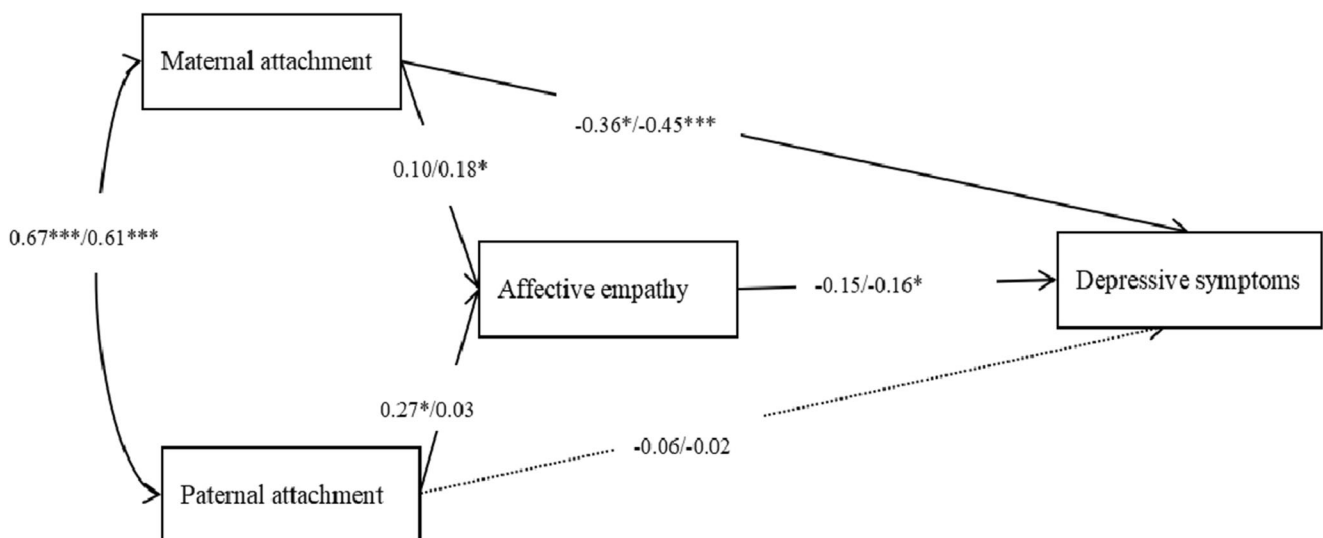
**Fig. 3** Model of cognitive empathy as mediating the association between parental attachments and depressive symptoms. Standardized coefficients are shown. Significant paths (\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ) are

depicted with a solid line and nonsignificant paths are shown with a dotted line. When two values are assigned to a path, the first refers to males and the second to females

relations between attachment and depressive symptoms. Our results indicated that affective empathy, rather than cognitive empathy, mediated the relationship between maternal attachment and depressive symptoms. These findings partially supported the risky empathy development model by highlighting that cognitive and affective components of empathy may be linked to depressive symptoms differently (Tone & Tully, 2014). Furthermore, the current study extends prior work by clarifying the gender differences in the relations among attachment, empathy and depression. The results demonstrated that maternal attachment was positively associated to affective empathy, which was negatively related to depressive symptoms

in females. For males, we only found that parental attachment was significantly associated with affective empathy, but not depressive symptoms. These findings indicate that gender, parental attachments and adolescent’s empathy need to be considered when understanding adolescent’s depressive symptoms.

As for discerning the distinct roles of cognitive and affective empathy in the relationship between parental attachment and depressive symptoms, the current study indicated affective empathy rather than cognitive empathy mediated the association between maternal attachment and depressive symptoms. We found that maternal attachment



**Fig. 4** Model of affective empathy as mediating the association between parental attachments and depressive symptoms. Standardized coefficients are shown. Significant paths (\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ ) are

depicted with a solid line and nonsignificant paths are shown with a dotted line. When two values are assigned to a path, the first refers to males and the second to females



was positively related to empathic concern, described by Tone and Tully (2014) as a typical or adaptive form of affective empathy, and empathic concern was negatively associated with depressive symptoms in the current study. Adolescents with higher levels of maternal attachment showed more affective empathy and in turn reported fewer depressive symptoms. Similar to Wei et al. (2011), our results suggest that adolescents with higher levels of maternal attachment may express more affective empathy which in turn may lead to the feeling that they are kind toward others and are doing something good for others, both of which would decrease their negative emotions. Our findings also suggest that lower levels of affective empathy are closely related to more depressive symptoms. According to the risky empathy development model (Tone & Tully, 2014), personal distress rather than empathic concern is a subdimension of affective empathy which is considered as a maladaptive emotional response to other's pain or unhappiness, and it is particularly linked to depression (O'Connor et al., 2002; Zahn-Waxler & Van Hulle, 2012). However, our study did not focus on personal distress, and future research on the role of personal distress between parental attachment and depressive symptoms would provide more references for the risky empathy development model. Although cognitive empathy negatively correlated with depression in the total sample and in males, we found that cognitive empathy did not mediate the association between parental attachments and depressive symptoms. According to a longitudinal study, cognitive empathy predicted lower levels of depression one year later (Green et al., 2018). Therefore, future studies are needed to clarify the longitudinal relations among cognitive empathy, parental attachments and depressive symptoms. These findings also suggest that improving empathy may be an important treatment target that can improve adolescent's depressive symptoms.

Consistent with our hypotheses, we found that maternal attachment showed more significant relations with affective empathy and depressive symptoms, compared to paternal attachment. Inconsistent with Chen et al. (2019), which indicated paternal attachment was more closely related to depression than maternal attachment, the findings in our current study highlighted that maternal attachment is particularly important for examining the relations with affective empathy and depressive symptoms. These findings are in line with previous studies that reported children who have poor attachments with mothers, as evidenced by receiving less supportive responses from mothers, may be at greater risk for developing depressive symptoms and decreased empathy (Schmid et al., 2011). The results could be further expanded into prevention or intervention efforts regarding depressive adolescent. Specifically, targeting the attachment style with their mothers might help with youth depressive symptoms, especially through methods involving affective empathy. These clinical implications, however, need more evidence from future studies that replicate our results in more heterogeneous samples.

The results in the current study also suggest a gender-specific pathway among parental attachments, empathy and depressive symptoms. Our findings indicate that parental attachment and affective empathy associations were stronger among same gender dyads (i.e., female adolescents and mothers and male adolescents and fathers). Despite the direct associations of maternal attachments with depressive symptoms in both males and females, paternal attachment was positively associated with affective empathy among males, while maternal attachment was positively related to affective empathy among females. These results are somewhat inconsistent with Boele et al. (2019), which demonstrated maternal relationship quality was more strongly associated with empathy in adolescence compared to paternal relationship quality. The current findings may be partially explained by the increasing involvement of fathers in parenting and in research studies. With the changing societal expectations for fathers and mothers, fathers are increasingly regarding themselves as having a more important role in their children's development (Buchler et al., 2017), which may contribute to their involvement in parenting practices and paternal attachments. The current study partially verified this positive involvement by indicating a positive association between paternal attachment and the development of adolescent's empathy. As suggested by Lv et al. (2019), the effect of fathers' involvement cannot be neglected in the development of children's emotional development. In fact, our results indicate that future efforts to reduce depressive symptoms and improve empathy in adolescents can be made by promoting positive father-child relationships.

We found some links were only significant only among females, which further contributed to gender differences in the empathy-attachment-depression relationship paradigm. Paternal attachment was only associated with cognitive empathy and affective empathy was only associated with depressive symptoms in females. According to Shek (2008), there are gender differences, such that females perceive parent-child relational quality to be better than males. Therefore, compared to males, females may tend to be more susceptible to the influences of attachments from both father and mother. Furthermore, previous studies suggested that the level of cognitive empathy in females is higher than males (Schwenck et al., 2014), and females are more sensitive to emotions than males (Yeo et al., 2007). Combining these findings, it serves as an explanation to the unique significant association between paternal attachment and cognitive empathy in females found in the current study. As indicated in previous studies, adolescents with high empathy are more sensitive to parental conflict, which has been linked to difficulties in emotion regulation (Van Lissa et al., 2017), and in turn may increase the risk for depressive symptoms.

Although the present study found several significant results, they should be interpreted in light of a few limitations.

First, in addition to the fact that we collected all data from the same group of adolescents, the study used questionnaires that ask more perceptive questions rather than factual ones, which falls into the profile of the common method variance (CMV). As a potential downside of common method variance, the effects of the current study might be inflated or deflated. Future research should prioritize multi-informant ratings in their data collection. It should be noted, however, that adolescents tend to be better raters of their own depression, compared to parent or teacher ratings (Tepper et al., 2008). Second, we specifically examined the mediating role of empathy, but did not include the examination of other possible mediators in the attachment-depression relationship. Future research should also examine other potential mechanisms between parental attachment and depression, including emotion regulation (Kullik & Petermann, 2013). Third, although we examined the mediating roles of cognitive empathy and affective empathy on the relationships between parental attachment and depressive symptoms, results should be interpreted with caution given the cross-sectional nature of our data. Our current cross-sectional design precluded us from drawing causal relationships between the variables. Future research with a longitudinal or experimental design that enables researchers to verify the findings is needed. Fourth, the generalizability of the findings should also be considered as a potential limitation. The sample, which consisted primarily of Chinese adolescents from two provinces may not be representative of Chinese adolescents as a whole, due to cultural shifts in different locations in China. Lastly, given the low reliability of the Empathic Concern subscale in the current study, more studies with diverse samples and using different measurements of adolescent empathy are necessary for examining the generalizability of our results.

In conclusion, the results of the current study underscore the need for examining the distinct relationships among maternal attachment, paternal attachment, cognitive empathy and affective empathy in depression research among adolescents. The present study indicated that affective empathy, but not cognitive empathy, showed a mediating role between maternal attachment and adolescent's depressive symptoms in the total sample. Although our findings highlighted a strong link between maternal attachment and adolescent's depressive symptoms, paternal attachment showed no significant relations with adolescent's depressive symptoms. These findings can inform family intervention programs for adolescent depression that target and promote maternal attachment and affective empathy among adolescence. Furthermore, our research has explored the gender differences of these relationships. The present study conducted multiple group analysis to determine whether the proposed relationships differ by gender. The findings indicated that paternal attachment positively related to cognitive empathy in adolescent girls and positively associated with affective empathy in adolescent boys, while

maternal attachment only significantly related to affective empathy in girls. These findings suggest that it is important to consider gender differences when promoting adolescent's psychological well-being. For the intervention of adolescent's depressive symptoms, improving maternal attachment may be beneficial for both boys and girls, and targeting on the improvement of affective empathy may be beneficial to girls in particular.

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**Data Availability** The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Ethics Approval** All the procedures involving human participants were in accordance with ethical standards and previous parents' authorizations were obtained.

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

**Conflict of Interest** None.

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