

Parental Bonding and College Freshmen's Depression Symptoms in China: The Mediating Role of Neuroticism

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Abstract

Background: This study aims to examine the influence of parental bonding on depression symptoms and the mediating role of neuroticism in their association among college freshmen.

Methods: A sample of 2636 first-year college students from a university in Liaoning province, China were recruited. The care and control subscales of Parental Bonding Instrument (PBI), Beck Depression Inventory-II (BDI-II), and the neuroticism scale of Eysenck Personality Questionnaire (EPQ) were used to measure parental bonding, depression symptoms, and neuroticism, respectively.

Results: Structural equation models indicated that maternal or paternal care negatively predicted depression symptoms, while maternal control had a significant and positive prediction of depression symptoms. Additionally, the interaction effects between care and control from both mothers and fathers on depression symptoms were also significant. The negative predictive effects of parental (maternal or paternal) care on depression symptoms were greater when parental (maternal or paternal) control was at a high level. Finally, neuroticism partially mediated the relationships between maternal care or control and depressive symptoms, paternal care and depressive symptoms; while served as a full mediator in the association between paternal control and depression symptoms.

Conclusion: Parental bonding can directly affect college freshmen's depression symptoms, and have indirect effects via the mediating role of neuroticism. These results may advance our understanding of the influence of family environment on college freshmen's depression symptoms and its mechanisms.

Introduction

A university career is vitally important for individuals' progress and development. However, it is accompanied by increased stressors because of the changing environment. Therefore, college students are faced with an increasing risk of mental health problems, such as experiencing depression symptoms (1–3). Relevant research has revealed a rising prevalence of depression among college students (4–6). Among college students, freshmen have newly experienced the transition from high school to college, which may easily cause various maladjustments, thus leading to a higher risk of depression than for students in the other three grades (7–8).

In a cross-sectional study, Gao et al. (8) surveyed 1017 Chinese college freshmen and found that the prevalence of depression (from mild to severe) was 45.3%. Another cross-sectional study surveyed 400 Bangladeshi first-year university students. The results showed that the prevalence depression reached a maximum of 69.5% (9). Iorga, Dondas and Zugun-Eloae (10) further investigated the differences in depression prevalence between the years of study among medical students. They revealed that freshmen are more depressed than non-freshmen. Therefore, it is necessary to explore the antecedents of college freshmen's depression symptoms and further explore the mechanisms. This study aims to investigate the influence of family environment and individual personality on depression symptoms of Chinese college freshmen.

Parental binding and depression symptoms

Parental bonding, which is an important environmental factor, is closely related to depression symptoms. Loas (11) proposed a model of depressive vulnerability and pointed out that genetic and environmental factors jointly affected individuals' depression symptoms. First, environmental factors, such as parental bonding may influence one's personality traits and cognitive style and further lead to an increase or decrease in depression symptoms. According to the diathesis-stress model of depression, chronic stress caused by negative parental bonding may have long term negative effects, which may cause more depression symptoms (12). Existing studies have also verified the correlation between parental bonding and depression symptoms (13–18).

The Parental Bonding Instrument (PBI), compiled by Parker et al. (19) is widely used to assess parenting behaviors in two dimensions: care and protection. In China, Yang et al. (20) revised the PBI among Chinese college students, and extracted three factors from it: care, encouragement and control. This was conducted through exploratory factor analysis. Numerous studies have suggested that a lack of care and excessive control (overprotection) were associated with more depression symptoms. (21). The warmth from both fathers and mothers measured by the PBI was associated with a lowered risk of depression (22). Fei et al. (13) focused on the association between parental control as per the PBI and depression symptoms among college freshmen. They found that maternal and paternal control both had a more significant positive effect on depression symptoms for males than females. In another Korean study, four parenting styles were classified according to the scores of PBI care and control: optimal parenting, affectionate constraint parenting, neglectful parenting, and affectionless control parenting, which meant low care and high control. Results demonstrated that participants under affectionless control parenting had higher depression scores (23). However, few studies have investigated the interaction effect between parental care and control on depression symptoms and the mechanisms behind this association.

The mediating effect of neuroticism

Neuroticism is a personality trait and is always related to negative emotions, nervousness, and insecurity (24). Previous studies found that neuroticism was related to both parental bonding and depression symptoms. First, parental bonding directly affects neuroticism in children (25), adolescents (26, 27), and adults (28, 29). Takahashi et al. (29) assessed 664 healthy Japanese adults' parental styles, and neuroticism through the PBI and NEO Personality Inventory, respectively. They also differentiated four parental styles as above. The results demonstrated that participants with affectionless control parents had higher scores in neuroticism. Second, high neuroticism is generally recognized as a risky factor for depression (30–32). Individuals with higher levels of neuroticism are probably more depressive in their current lives (33), and more likely to develop depression in the future (34).

Moreover, in line with the diathesis-stress perspective (35), neuroticism and negative parenting style may have a continuous effect on depression symptoms. Specifically, individuals in a stressful family environment, such as those who experience or have experienced dysfunctional parenting styles may become more neurotic. Higher neuroticism then leads to more depression symptoms. This mediating

effect of neuroticism between parenting style and depression symptoms has been verified by previous studies (36–38). Ono et al. (38) investigated the effects of the quality of parenting and neuroticism on depression symptoms in a cross-sectional study. They found that parental care and control not only directly predicted depression symptoms but also indirectly affected depression symptoms through the mediating role of neuroticism. Another study also reported that neuroticism acted as a mediator in the effect of parental overprotection on males' depression symptoms (36). However, it is not known whether the two parenting (maternal or paternal) attributes: care and control, both indirectly influenced depression symptoms through the mediating role of neuroticism. Based on the primary literature above, this study aims to examine the following two questions: Whether maternal or paternal parenting bonding directly affects depression symptoms among Chinese college freshmen and whether neuroticism plays a mediating role in their relationship? The proposed conceptual model is shown in Figure 1.

Methods

Participants and survey

The datasets for this study were collected during September and October 2021, when the college freshmen had just entered university. A total of 2943 first-year students in a university in China's Liaoning province were recruited. They completed questionnaires on a specially designed mobile app. The questionnaires included the PBI (Chinese version), the Beck Depression Inventory-II (BDI-II) (Chinese version), and the neuroticism scale of the Eysenck Personality Questionnaire (EPQ). We eliminated 307 invalid questionnaires, whose completion time was less than three minutes. Thus we finally retained 2636 valid questionnaires, with 766 males and 1870 females.

Measures

Care and Control scales of Parental Bonding Instrument

Parker et al. (19) compiled the 25-item PBI. The items are rated on a four-point Likert scale, ranging between 0 (very likely) to 3 (very unlikely). Yang et al. (20) revised and explored the factorial structure of the Chinese version PBI. The final revised "Mother version" (PBI-M) and "Father version" (PBI-F) both contained 23 items, and each included three subscales: care (11 items), encouraging autonomy (6 items), and control (6 items). A higher total score indicating stronger corresponding parenting attributes. In this study, care and control subscales were selected. The Cronbach's α for care and control in the PBI-M was 0.89 and 0.75. The Cronbach's α for care and control in the PBI-F was 0.92 and 0.75.

Beck Depression Inventory-II

The BDI-II (39) contains 21 items, which are associated with the symptoms of depression. Each item consists of four statements. These statements scored from 0–3 in turn, with higher total scores implying an increasing symptom's severity. People who score 0–13 are considered as being free of depression; people scoring 14–19 are seen as being "mildly" depressed; those scoring 20–28 are seen as being

“moderately” depressed; and those scoring 29–63 are seen as being “severely” depressed (40). The Cronbach’s α in the study was 0.89.

Neuroticism scale of of Eysenck Personality Questionnaire (EPQ)

Eysenck (41) developed the EPQ. We used the Chinese version of the neuroticism scale, which was revised and translated by Yaoxian Gong (42). This scale consists of 24 items. The participants answered “yes” or “no” on this scale, which were each assigned a value of 1 or 0, respectively. A higher score indicated a higher level of neuroticism. In this study, the Cronbach’s α was 0.89. First, we calculated the total score and thereafter converted it into the standard t-scores based on the Chinese adult norm.

Procedure

The college freshmen entered the classroom in batches. First, the research assistants explained the procedure and requirements. They thereafter told the students how to enter the mobile app via WeChat. The participants immediately completed the online questionnaires on the spot. Ethical approval was obtained from the Ethics Committee for Scientific Research at the corresponding author’s university.

Statistical analysis

We used the Statistical Package for the Social Sciences (SPSS) version 20.0 and Mplus 7.0 to organize and analyze the data. The correlations between each variable were analyzed via SPSS 20.0. Then structural equation modeling (SEM) through Mplus 7.0 was used to analyze the proposed model, with all the regression coefficients tested by the bias-corrected percentile Bootstrap method. We tested the mediation and moderating effects in the proposed model by estimating their 95% confidence interval (CI) with 1000 resampled samples. Age and gender were controlled for all the correlation and regression analyses.

Results

Descriptive statistics and correlations

Table 1 showed the means, standard deviations, and correlation matrices of each variable. As shown in Table 1, the depression symptoms were positively associated with maternal control ($r = 0.28, p < 0.001$), paternal control ($r = 0.24, p < 0.001$), and neuroticism ($r = 0.69, p < 0.001$). The depression symptoms were negatively associated with maternal care ($r = -0.37, p < 0.001$) and paternal care ($r = -0.38, p < 0.001$). Neuroticism was positively associated with maternal control ($r = 0.30, p < 0.001$), paternal control ($r = 0.28, p < 0.001$); and negatively associated with maternal care ($r = -0.37, p < 0.001$) and paternal care ($r = -0.37, p < 0.001$). The two parental bonding variables for maternal and paternal bonding were significantly correlated with each other.

Table 1
Descriptive statistics and correlations among variables

	1	2	3	4	5	6
1. Mother care	1					
2. Mother control	-0.37 ^{***}	1				
3. Father care	0.58 ^{***}	-0.26 ^{***}	1			
4. Father control	-0.32 ^{***}	0.59 ^{***}	-0.27 ^{***}	1		
5. Depression symptoms	-0.37 ^{***}	0.28 ^{***}	-0.38 ^{***}	0.24 ^{***}	1	
6. Neuroticism	-0.37 ^{***}	0.30 ^{***}	-0.37 ^{***}	0.28 ^{***}	0.69 ^{***}	1
<i>M</i>	31.99	5.69	28.38	4.28	7.89	48.05
<i>SD</i>	5.85	3.63	6.91	3.26	7.96	12.86
Note: ^{***} $p < 0.001$, ^{**} $p < 0.01$, [*] $p < 0.05$						

Testing of mediation effects

The proposed models showed a great fit (PBI-M: RMSEA = 0.075, SRMR = 0.025, CFI = 0.981, TLI = 0.931; PBI-F: RMSEA = 0.064, SRMR = 0.022, CFI = 0.986, TLI = 0.949). In the PBI-M model shown in Figure 2, maternal care negatively predicted neuroticism ($\beta = -0.30, p < 0.001$) and the depression symptoms ($\beta = -0.10, p < 0.001$). Maternal control positively predicted neuroticism ($\beta = 0.19, p < 0.001$) and the depression symptoms ($\beta = 0.041, p < 0.05$). The interaction between maternal care and maternal control negatively predicted the depression symptoms ($\beta = -0.070, p < 0.01$). Neuroticism had a significant and positive effect on the depression symptoms ($\beta = 0.64, p < 0.001$). Furthermore, the upper and lower bounds of the bootstrapped 95% CI for the mediating effects of neuroticism in the relationships between maternal care and depression symptoms (indirect effect = -0.19, SE = 0.013, 95% CI = [-0.21, -0.17]), and maternal control and depression symptoms (indirect effect = 0.12, SE = 0.013, 95% CI = [0.10, 0.14]) did not include 0, indicating that there were significant mediating effects.

The interaction effect is shown in Figure 3. For freshmen with low maternal control ($M_{\text{maternal control}} - SD_{\text{maternal control}}$), the negative predictive effect of maternal care the on depression symptoms was not significant ($\beta = 0.040, p > 0.05$); while for freshmen with high maternal control ($M_{\text{maternal control}} + SD_{\text{maternal control}}$), the negative predictive effect of maternal care was significant ($\beta = -0.17, p < 0.001$).

In the PBI-F model shown in Figure 4, paternal care negatively predicted neuroticism ($\beta = -0.32, p < 0.001$) and the depression symptoms ($\beta = -0.13, p < 0.001$). Paternal control positively predicted neuroticism ($\beta = 0.20, p < 0.001$), but not the depression symptoms ($p > 0.05$). The interaction between paternal care and

paternal control negatively predicted the depression symptoms ($\beta = -0.060, p < 0.01$). Neuroticism had a significant and positive effect on the depression symptoms ($\beta = 0.64, p < 0.001$). Moreover, the upper and lower bounds of the bootstrapped 95% CI for the mediating effect of neuroticism in the relationships between paternal care and the depression symptoms (indirect effect = $-0.20, SE = 0.013, 95\% CI = [-0.23, -0.18]$), and paternal control and the depression symptoms (indirect effect = $0.13, SE = 0.013, 95\% CI = [0.11, 0.15]$) did not include 0, indicating that there were significant mediating effects.

The interaction effect is shown in Figure 5. For freshmen with low paternal control ($M_{\text{paternal control}} - SD_{\text{paternal control}}$), the negative predictive effect of paternal care was smaller ($\beta = -0.074, p < 0.001$); while for freshmen with high paternal control ($M_{\text{paternal control}} + SD_{\text{paternal control}}$), the negative predictive effect of paternal care was bigger ($\beta = -0.19, p < 0.001$).

Discussion

Although the association between parental bonding and depression symptoms is widely acknowledged (13–18), there were three limitations not fully resolved. The first is that few studies have verified this association under the Chinese culture and among college freshmen, who are at high risk for depression (8). The second question is whether the three parenting attributes from mothers or fathers as measured by the PBI have different relationships with depression symptoms. The final issue is that the mechanisms accounting for this association were not fully understood. To contribute to this gap, this study mainly investigated the direct effects of both maternal and paternal parental bonding on Chinese college freshmen's depression symptoms and their indirect effects via the mediating role of neuroticism.

Parental bonding and depression symptoms

The results showed that low levels of care and high levels of control are associated with more depression symptoms. This finding is consistent with that of previous studies (36, 38, 43–45). According to the model of depressive vulnerability, environmental and genetic risky factors interact with each other and jointly contribute to depression symptoms. Therefore, low care and high control parenting make individuals more vulnerable to depression. Furthermore, the results demonstrated that the depression symptoms were only significantly predicted by maternal control but this was not so for paternal control. A possible reason for the insignificance of paternal control is that mothers tend to be stricter than fathers in Chinese families, which is similar to “Tiger mom, cat dad”. The results also showed that maternal control (5.69) was significantly larger than paternal control (4.28). Another possible reason may be that gender is controlled for in this study. Fei et al. (13) investigated the role of gender in the association between parental control and depression symptoms and found that paternal control had a greater influence on males' depression symptoms.

This study also found a significant interaction effect between maternal or paternal care and maternal or paternal control on depression symptoms besides the main effects. Specifically, maternal or paternal care had a greater negative influence when maternal or control was high. This meant that low care and high

control parenting caused individuals most at risk for depression. This finding is also in line with that of previous studies (46, 47). Researchers distinguished affectionless control (low care and high control) parenting from the other three parenting styles and found that this parenting style was an antecedent to depression in adults (23, 43), adolescents (21, 48), and children (46). Based on the above researches, this study's results further confirmed the interaction effect between parental care and control. It established that low care and high control, that is, affectionless control parenting was predictive of depression symptoms.

The mediating role of neuroticism

Besides the direct effects of parental care or control on the depression symptoms, their indirect effects via the mediating role of neuroticism were also found. This result was consistent with that of previous studies (36–38). As the diathesis-stress theory (35) indicated, life stress may influence individuals' personal traits first and thereafter lead to mental disorders. In line with this theory, this study found that low parental care and high parental control contributed to an increase in neuroticism, which then caused more depression symptoms. Moreover, the results demonstrated that neuroticism partially mediated the relationships between maternal care or control and depression symptoms, and paternal care and depression symptoms. This simultaneously completely mediated the relationship between paternal control and depression symptoms. The reason for this full mediation effect may be that there is a lower mean value of paternal control than that of maternal control. Furthermore, as the old Chinese saying goes, "a strict father makes a dutiful son". Thus, appropriate paternal control possibly incurs positive results. Only when paternal control increases neuroticism can it bring about more depression symptoms.

Limitations

There are some limitations to this study: first, the causality among parental bonding, neuroticism, and depression symptoms cannot be deduced from this study because of its cross-sectional design. Future studies could adopt a longitudinal design to examine the causal relationships among the three variables. Second, gender was controlled in this study. However, the Chinese saying states, "raising a son should be economical and raising a girl should be done generously". Thus, parenting styles from mothers or fathers may vary according to an individual's gender. This may interfere with the results of this study. A Chinese study focusing on the relationship between parental control and college freshmen's depression symptoms found that both maternal and paternal control had more significant positive effects on males' depression symptoms (13). Thus, in future studies, the gender variable should be considered. Finally, only neuroticism was selected to examine its mediating effect between parental bonding and depression symptoms. Other personality traits such as extraversion have been found to be related to both parental bonding (49, 50) and depression symptoms (51, 52). Therefore, future studies should further explore the mediating role of extraversion in the relationship between parental bonding and depression symptoms.

Conclusion

To sum up, this study's results support the diathesis-stress theory of depression, which claimed that environmental factors (parental bonding) and individual factors (neuroticism) jointly contributed to one's depression symptoms. Moreover, it has some practical implications for the prevention or intervention of college freshmen's depression symptoms. It is vitally important for parents to provide sufficient care to their children while ensuring that they will not be over-controlled. Furthermore, colleges should pay more attention to those freshmen with high levels of neuroticism, which means those who are at a high risk of depression, and take measures to reduce their neuroticism level. In summary, families and colleges should collaborate to protect freshmen from developing depression symptoms.

Declarations

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Authors' contributions

Jinsheng Hu contributed to the conception of the study and was responsible for the data collection. Tengxu Yu and Longfei Zhang analyzed the data. Tengxu Yu wrote the draft of the paper. All authors have read and approved the final manuscript.

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Availability of data and materials

The datasets generated and analyzed during the current study are not publicly available due our commitment of confidentiality to students, but are available from the corresponding author on reasonable request.

Ethics approval and consent to participate

The studies involving human participants were reviewed and approved by Ethics Committee of Liaoning Normal University. Written informed consent to participate in this study was provided by the participants. All methods were carried out in accordance with relevant guidelines and regulations.

Consent for publication

None.

Competing interests

All authors declare no conflict of interest.

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Figures

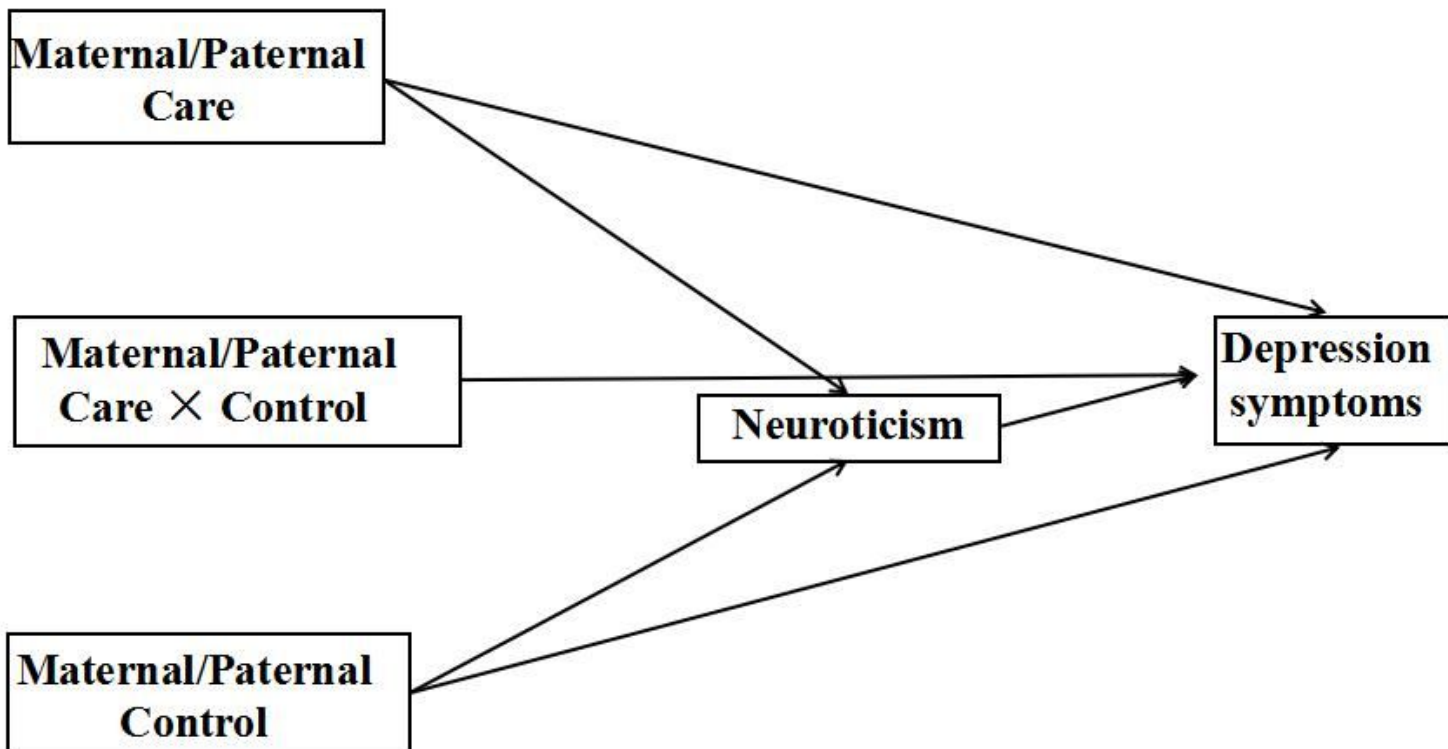


Figure 1

Proposed conceptual model

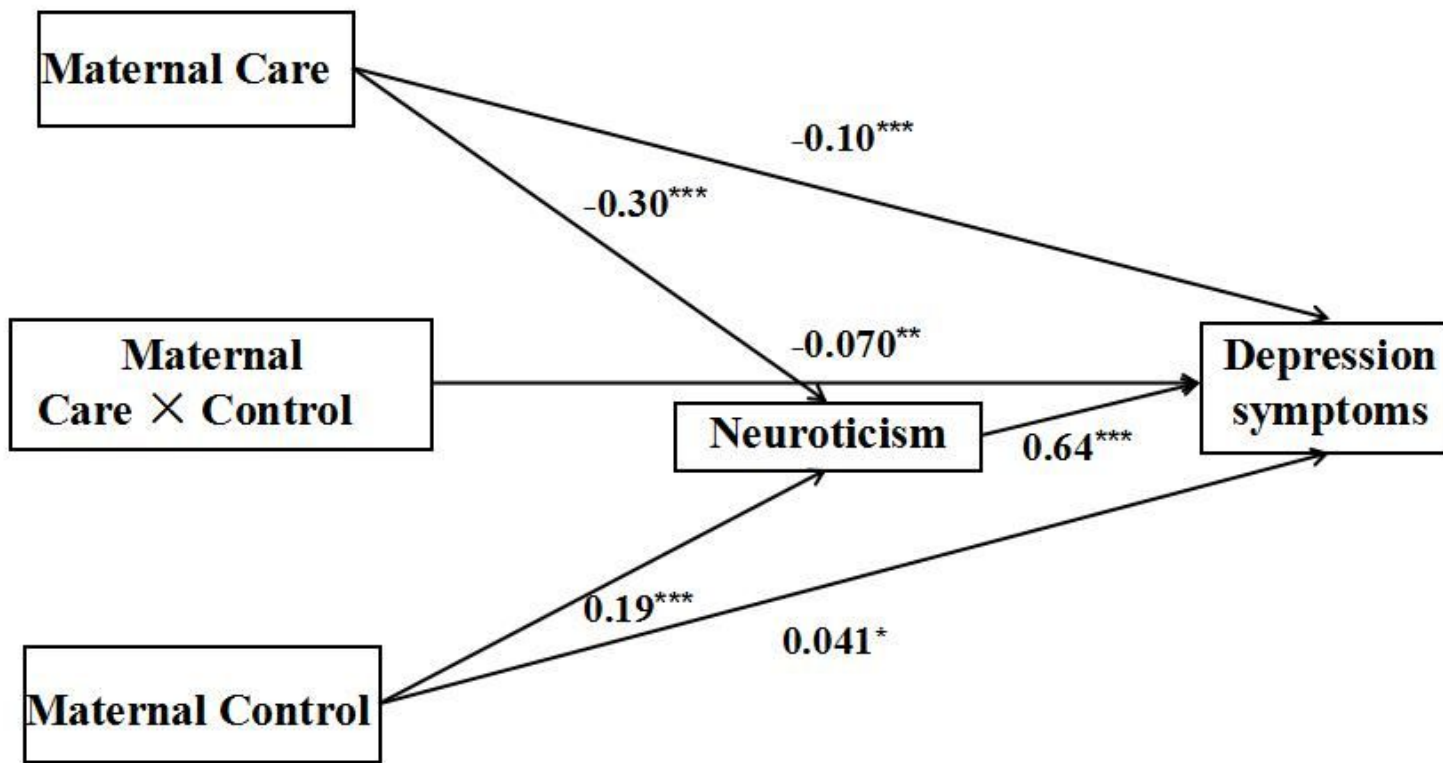


Figure 2

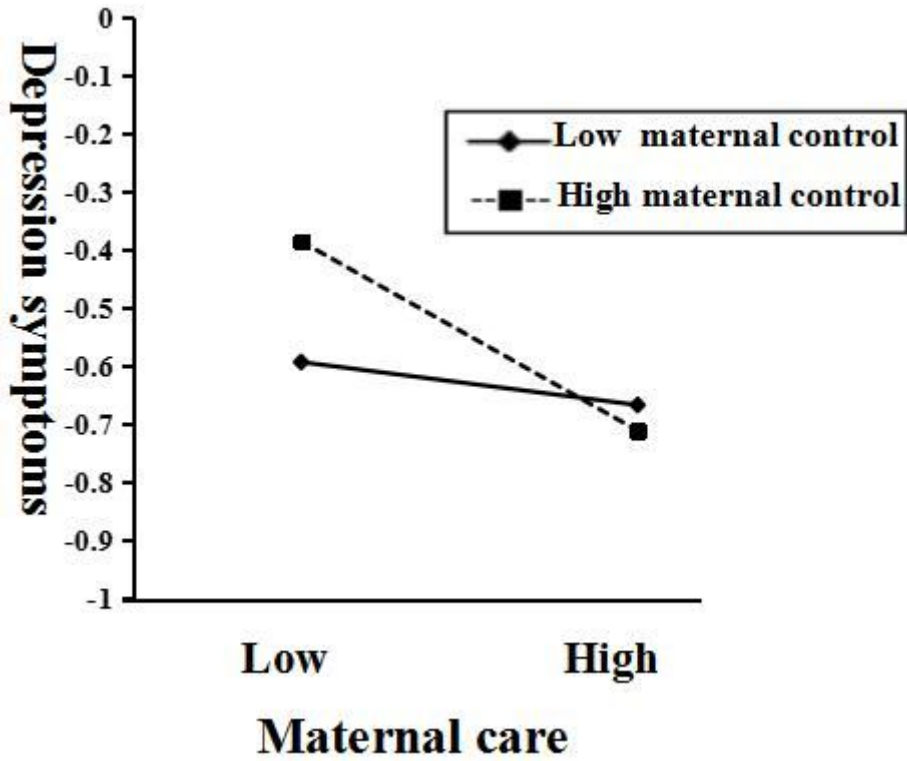


Figure 3

Interaction plot between maternal care and control on depression symptoms

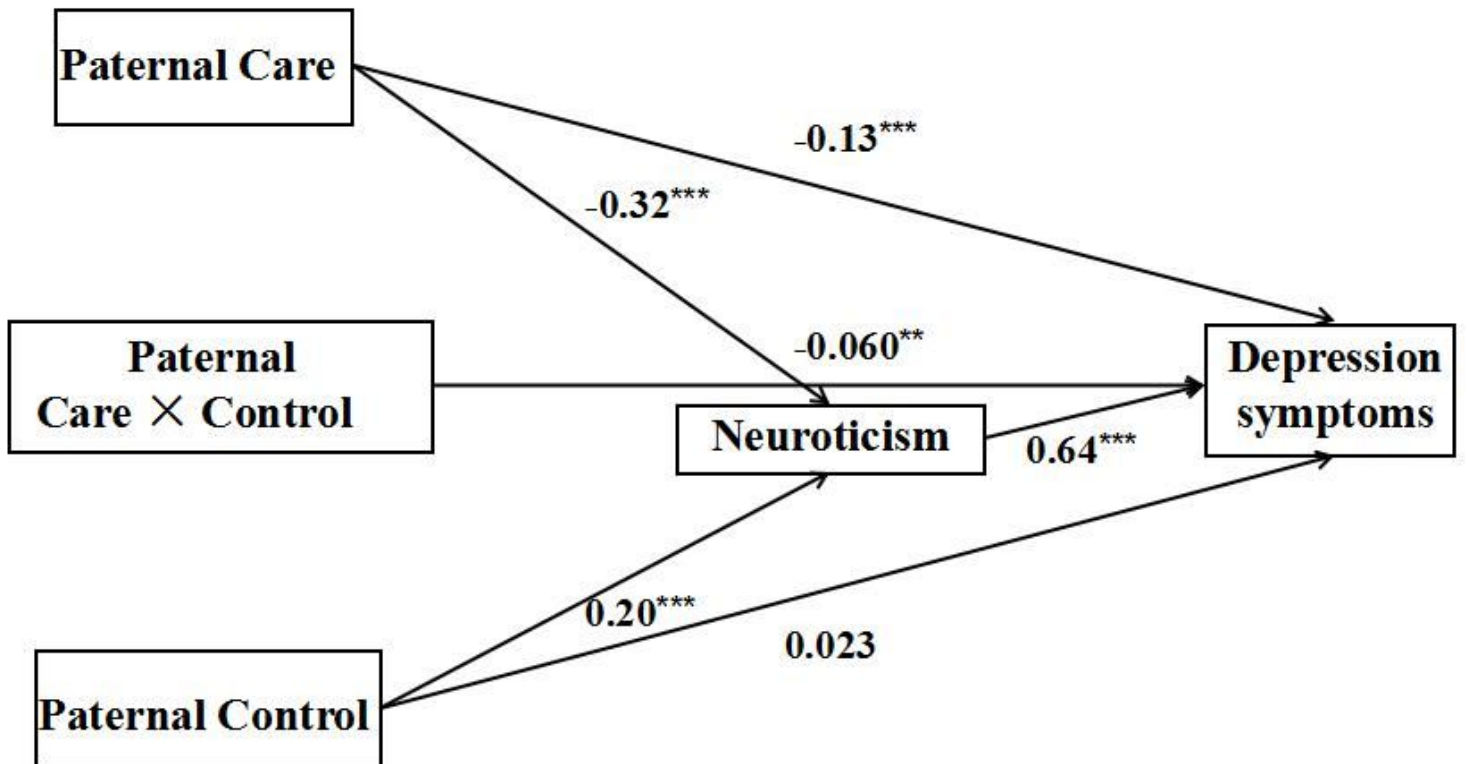


Figure 4

Path model of the PBI-F model

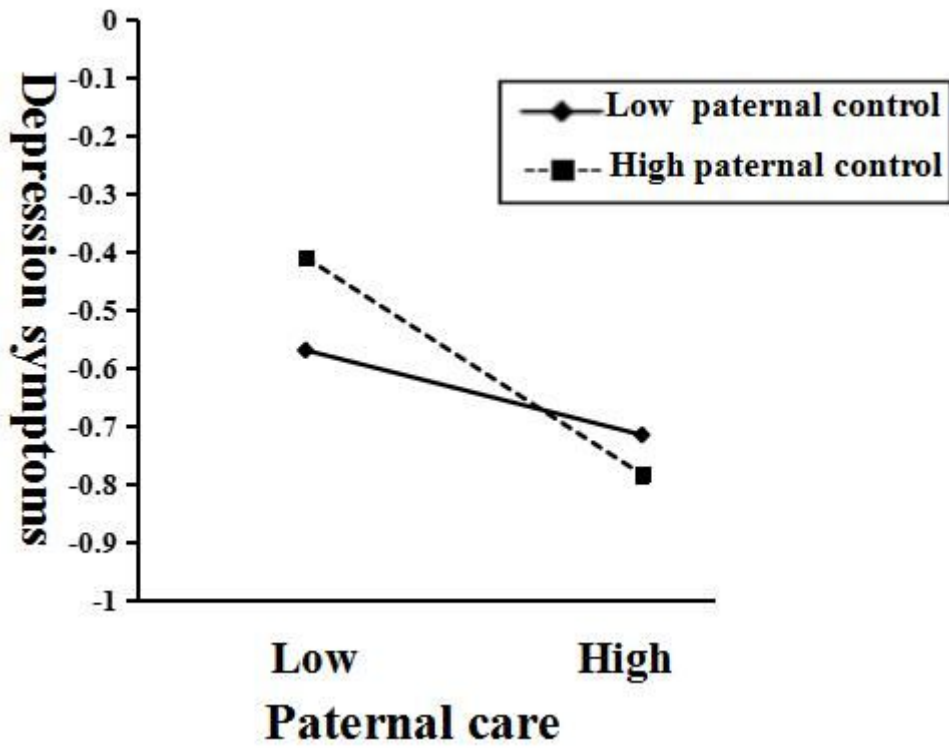


Figure 5

Interaction plot between paternal care and control on depression symptoms