



# Effects of Maternal Depression on Adolescent Offspring Depression and Anxiety: Mediating Role of Emotional Trauma in a Community-Based Study

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**Objectives:** Maternal depression negatively affects depression and anxiety symptoms in the offspring. This study examined the association between maternal depression and their adolescent offspring depression and anxiety, as well as the mediating role of emotional trauma in determining the association.

**Methods:** Participants were 237 mothers (46.08±5.00 years) and their adolescent offspring (16.54±1.51 years). The participants completed the Beck Depression Inventory-II, Early Trauma Inventory Self Report-Short Form, Center for Epidemiological Studies Depression Scale for Children, and the Screen for Children's Anxiety Related Disorders. The mediating effect of emotional trauma on offspring was explored using mediation analysis.

**Results:** Maternal depressive symptoms were significantly correlated with adolescent offspring traumatic experiences, as well as with their depressive and anxiety symptoms. Mediation analysis results showed that emotional trauma of offspring significantly mediated the effect of maternal depression on their depressive and anxiety symptoms.

**Conclusion:** Findings indicate that maternal depression was significantly associated with depressive and anxiety symptoms in adolescent offspring, mediated by their emotional trauma. Future research is needed to investigate pathways and intervention strategies to prevent the intergenerational transmission of emotional problems.

**Keywords:** Maternal depression; Offspring depression; Offspring anxiety; Emotional trauma.

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## INTRODUCTION

Studies on the intergenerational transmission of psychopathology from mothers to offspring indicate that maternal depression is a significant concern that negatively affects offspring mental health. Maternal depression may lead to negative parenting and maltreatment, which are associated with behavioral and emotional problems in offspring [1]. Furthermore, maternal depressive symptoms are highly related to depressive and anxiety symptoms in adolescent offspring [2,3].

Maternal depressive symptoms increase the risk of harsh parenting, which mediates disruptive adolescent behaviors [4], and are also risk factors for maltreatment of offspring. In the presence of maternal depressive symptoms and chil-

dren's maltreatment experiences, the probability of psychopathology among offspring is 12 times higher than when these factors are absent [5]. Notably, maternal depression increases the risk of maltreatment experiences by 2.4 times, and these maltreatment experiences mediate offspring depression [6,7]. Among children who experience maltreatment, emotional trauma from mother-child interactions is very common. Therefore, maternal depressive symptoms influence children's emotional trauma experiences, which in turn may contribute to their emotional problems such as depression and anxiety. However, research on the impact of maternal depressive symptoms on offspring's mental health is often limited to studies focusing on specific areas, such as early childhood development. Studies on maternal depression, adolescent psychosocial outcomes, and mediating factors are lacking. In particular, among the studies on the relationship between maternal depression and children's emotional prob-

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lems, there is little research on emotional trauma as a mediating factor.

Therefore, the present study aimed to investigate the relationship between maternal depressive symptoms and adolescent offspring depression and anxiety symptoms. Furthermore, it explored the mediating role of emotional trauma in determining the effects of maternal depressive symptoms on depression and anxiety symptoms in adolescent offspring.

## METHODS

### Participants and procedure

The present study involved mothers with their adolescents aged between 12 and 18 years attending school for more than six months in Jeju Special Self-Governing Province, Korea. Two middle and high schools were selected in collaboration with the Jeju Special Self-Governing Provincial Office of Education. Information including the study background and informed consent to participate in the study was distributed. A total of 237 mother-offspring dyads who completed the survey were included in the study. Data were collected between September and December, 2017. Written informed consent was obtained from mothers and their offspring. The study procedures were approved by the Institutional Review Board of Jeju National University Hospital (Grant No. 2022-07-018).

### Measures

#### Early Trauma Inventory Self Report-Short Form

The Early Trauma Inventory Self Report-Short Form (ETISR-SF) is a 27-item questionnaire used to evaluate four childhood trauma subtypes before the age of 18 years, and includes physical trauma (5 items), emotional trauma (5 items), sexual trauma (6 items), and general trauma (11 items) [8]. In particular, emotional trauma comprises items such as “often put down or ridiculed,” “often ignored or made to feel you didn’t count,” “often told you are no good,” “most of the time treated in cold or uncaring way or made to feel like you were not loved,” and “parents failed to understand you or your needs.” Each traumatic experience is answered with a “yes” (coded as 1) or “no” (coded as 0). The sum of the scores for each subtype and the total scores were calculated. The Korean version of the ETISR-SF has been found to be a reliable and valid instrument for Korean adolescents (Cronbach’s  $\alpha=0.803$ ) [9]. In the present study, the scores for traumatic experiences according to the four subtypes and the total score for traumatic childhood experiences were used.

#### Beck Depression Inventory

In the present study, the Beck Depression Inventory (BDI-II) was used to evaluate the severity of maternal depression. It is a self-report scale developed by Beck et al. [10], comprising 21 questions that evaluate the cognitive, emotional, and physiological symptoms of depression. Each item is scored from 0 to 3 points, and higher scores indicate more severe depression. A standardized Korean version of the scale was used (Cronbach’s  $\alpha=0.91$ ) [11].

#### Center for Epidemiological Studies Depression Scale for Children

The Center for Epidemiological Studies Depression Scale for Children (CES-DC) is a depression inventory developed by the National Institute of Mental Health to measure the degree of depressive symptoms, and has excellent validity for children and adolescents aged 6–17 years [12]. The CES-DC is a 20-item self-report depression inventory that measures symptoms of depression over the past week, and is scored on a 4-point scale with scores ranging from 0 to 60. Higher total scores indicate higher levels of depression.

#### Screen for Children Anxiety Related Disorders

Birmaher et al. [13] developed the Screen for Children Anxiety Related Disorders (SCARED) to assess a child’s anxiety symptoms, and it has been established as a valid and sensitive measure. This self-report scale comprises 41 questions, scored from 0 to 2, with higher scores indicating higher anxiety levels. The total scores of the Korean version of the SCARED [14] were used in this study.

### Statistical analysis

Demographic variables were analyzed using descriptive statistics. The ETISR-SF scores were analyzed by dividing the participants into groups with 0, 1, 2, 3, and 4 or more traumatic experiences. Continuous variables were expressed as means $\pm$ standard deviation. Pearson correlation analysis was performed to assess the associations between the ETISR-SF, maternal BDI-II, CES-DC, and SCARED scores. Multiple linear regression analysis was used to confirm the associations between the offspring emotional trauma, maternal depression, and offspring depressive and anxiety symptoms after adjusting for sociodemographic characteristics. Both unstandardized and standardized coefficients have been reported. To analyze the mediating effect of offspring emotional trauma, Model 4 of the mediation models of Process Macro for SPSS, proposed by Hayes, was used [15]. The mediating effect was interpreted as statistically significant if zero was not included in the 95% confidence interval (CI). The significance level was set at  $p<0.05$ . Analyses were performed us-

ing SPSS version 18 (SPSS Inc.) and Process Macro for SPSS (version 3.4; <https://processmacro.org/index.html>).

## RESULTS

### Participant characteristics

Participants included 237 mothers and their adolescent

**Table 1.** Demographic characteristics of the participants

Characteristics	Value (n=237)
Mother related variables	
Maternal age (yr)	46.08 ± 5.00
Socioeconomic status	
High	65 (27.4)
Middle	142 (59.9)
Low	22 (9.3)
Missing value	8 (3.4)
BDI-II	4.92 ± 6.37
Offspring related variables	
Offspring's sex	
Male	82 (34.6)
Female	155 (65.4)
Offspring's age (yr)	16.54 ± 1.51
Offspring's education level	
Middle school	77 (32.5)
High school	160 (67.5)
CES-DC	15.12 ± 10.03
SCARED	15.76 ± 12.35
ETISR-SF	
0	138 (58.2)
1	41 (17.3)
2	19 (8.0)
3	9 (3.8)
≥ 4	30 (12.7)

Values are presented as mean ± standard deviation or number (%). BDI-II, Beck Depression Inventory; CES-DC, Center for Epidemiological Studies Depression Scale for Children; ETISR-SF, Early Trauma Inventory Self Report-Short Form; SCARED, Screen for Children Anxiety Related Disorders

offspring. The mean age of the mothers was 46.08±5.00 years while those of the adolescents was 16.54±1.51 years. Among adolescents, 155 (65.4%) were female and 82 (34.6%) were male. There were 77 middle school students (32.5%) and 160 high school students (67.5%). Middle income mother-offspring pairs were most common (142; 59.9%). Maternal mean BDI-II score was 4.92 (±6.37). Mean CES-DC score was 15.12 (±10.03), and the mean SCARED score was 15.76 (±12.35) among adolescents. Regarding the ETISR-SF scores, 99 adolescents (41.8%) scored 1 or higher; among them, 30 (12.7%) scored 4 or higher (Table 1).

### Factors affecting adolescent offspring depression and anxiety symptoms

Maternal depressive symptoms were significantly correlated with the adolescent offspring traumatic experiences, excluding sexual trauma, as well as with their depression and anxiety symptoms ( $p < 0.001$ ). Among childhood trauma types, the offspring emotional trauma showed a significant positive correlation with both their depression and anxiety symptoms ( $p < 0.001$ ). Except for emotional trauma, other subtypes of trauma had no significant relationship with adolescent depression and anxiety scores (Table 2). After adjusting for socioeconomic status, age and sex, maternal depressive symptoms were significantly associated with their offspring depression ( $p = 0.007$ ) and anxiety ( $p = 0.029$ ) symptoms. Additionally, offspring emotional trauma was significantly associated with their depression ( $p = 0.017$ ) and anxiety symptoms ( $p = 0.015$ ) (Table 3).

### Effect of maternal depressive symptoms on their adolescent offspring depression and anxiety symptoms as mediated by emotional trauma

Mediation analysis was performed to analyze the effect of maternal depressive symptoms on adolescent offspring depression and anxiety symptoms and whether this was me-

**Table 2.** Correlations between the measured variables

	Maternal BDI-II	Total score	General trauma	ETISR-SF Physical trauma	Emotional trauma	Sexual trauma	CES-DC
ETISR-SF							
Total score	0.361**						
General trauma	0.396**	0.833**					
Physical trauma	0.154*	0.800**	0.503**				
Emotional trauma	0.361**	0.801**	0.534**	0.466**			
Sexual trauma	-0.019	0.189*	0.026	0.014	0.148*		
CES-DC	0.202**	0.142*	0.114	0.063	0.193*	-0.028	
SCARED	0.168**	0.086	0.076	-0.019	0.183*	-0.043	0.674**

\* $p < 0.05$ ; \*\* $p < 0.01$ . BDI-II, Beck Depression Inventory; CES-DC, Center for Epidemiological Studies Depression Scale for Children; ETISR-SF, Early Trauma Inventory Self Report-Short Form; SCARED, Screen for Children Anxiety Related Disorders

**Table 3.** Multiple linear regression analysis for adolescent offspring depression and anxiety symptoms by maternal depressive symptoms and offspring's trauma

	Offspring's CES-DC					Offspring's SCARED				
	B	SE	B	t	p	B	SE	B	t	p
Crude										
Maternal BDI-II	0.318	0.101	0.202	3.155	0.002**	0.325	0.125	0.168	2.606	0.010*
Emotional trauma	2.376	0.789	0.193	3.010	0.003**	2.782	0.974	0.183	2.855	0.005**
Adjusted†										
Maternal BDI-II	0.267	0.098	0.169	2.736	0.007**	0.271	0.123	0.139	2.202	0.029*
Emotional trauma	1.868	0.778	0.149	2.401	0.017*	2.388	0.974	0.154	2.450	0.015*

\* $p < 0.05$ ; \*\* $p < 0.01$ ; †adjusted by maternal age, offspring's age, sex, and socioeconomic status. B, unstandardized coefficients; B, standardized coefficients; BDI-II, Beck Depression Inventory; CES-DC, Center for Epidemiological Studies Depression Scale for Children; SCARED, Screen for Children Anxiety Related Disorders; SE, standard error of B

**Table 4.** The mediation analysis for the direct and indirect effect of maternal depressive symptom on offspring's emotional problem via emotional trauma

Path	B	SE	95% CI	p
BDI-II → Emotional trauma → Offspring's CES-DC				
Total effect	0.318	0.101	0.119–0.516	0.018*
Direct effect	0.239	0.107	0.024–0.450	0.027*
Indirect effect	0.078	0.039	0.009–0.163	
BDI-II → Emotional trauma → Offspring's SCARED				
Total effect	0.325	0.125	0.079–0.571	0.010*
Direct effect	0.227	0.133	-0.035–0.488	0.090
Indirect effect	0.099	0.047	0.013–0.195	

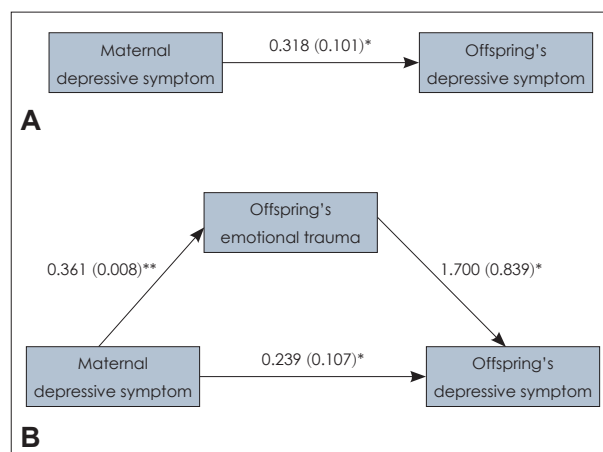
\* $p < 0.05$ . B, standardized coefficients; BDI-II, Beck Depression Inventory; CES-DC, Center for Epidemiological Studies Depression Scale for Children; CI, confidence interval; SCARED, Screen for Children Anxiety Related Disorder; SE, standard error of B

diated by their emotional trauma. We defined the independent variable as X (maternal BDI-II score), the dependent variable as Y (offspring CES-DC and SCARED scores), and the mediating variable as M (offspring emotional trauma score). The total effects of maternal depression significantly affected the offspring depression ( $p=0.018$ , 95% CI=0.119–0.516) and anxiety symptoms ( $p=0.010$ , 95% CI=0.079–0.571) (Table 4).

Both the direct effect ( $p=0.027$ , 95% CI=0.024–0.450) and the indirect effect ( $B=0.078$ , standard error [SE]=0.039, 95% CI=0.009–0.163) of maternal depressive symptoms on adolescent offspring depression were significant. Our results support the hypothesis of a mediating effect through emotional trauma in offspring (Table 4 and Fig. 1). While maternal depression (BDI-II) did not show a significant direct effect on adolescent offspring anxiety symptoms, it showed a significant indirect effect on their anxiety symptoms through emotional trauma ( $B=0.099$ , SE=0.047, 95% CI=0.013–0.195) (Table 4 and Fig. 2).

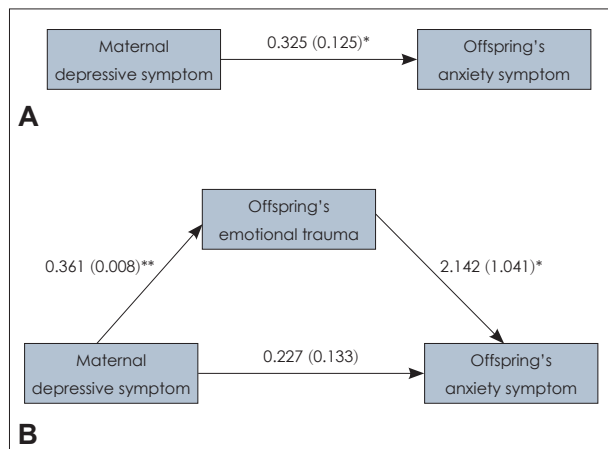
## DISCUSSION

This study examined the effects of maternal depressive symptoms on depression and anxiety symptoms in adoles-



**Fig. 1.** Diagrams to test for mediation effect. Mediation model with a X (total sum of maternal BDI), M (sum of offspring's emotional trauma), and Y (total sum of offspring's CES-DC). A: Total effect model. B: Mediation model. Standardized path coefficients and standard errors are presented. \* $p < 0.05$ ; \*\* $p < 0.01$ . BDI, Beck Depression Inventory; CES-DC, Center for Epidemiological Studies Depression Scale for Children.

cent offspring. Both maternal depressive symptoms and offspring emotional trauma were significantly related to depressive and anxiety symptoms in adolescent offspring. Notably, maternal depressive symptoms had a significant effect on adolescent offspring depression and anxiety symptoms, and this



**Fig. 2.** Diagrams to test for mediation effect. Mediation model with a X (total sum of maternal BDI), M (sum of offspring's emotional trauma), and Y (total sum of offspring's SCARED). A: Total effect model. B: Mediation model. Standardized path coefficients and standard errors are presented. \* $p < 0.05$ ; \*\* $p < 0.01$ . BDI, Beck Depression Inventory; SCARED, Screen for Children Anxiety Related Disorders.

effect was mediated by emotional trauma in the offspring.

Our findings demonstrated an association between maternal depressive symptoms and depression and anxiety symptoms in adolescent offspring. Our results are consistent with those of a previous community-based study, indicating that current maternal depressive symptoms are risk factors for anxiety and depressive symptoms in adolescent offspring [16]. Additionally, a previous meta-analysis reported that adolescents with mothers who experienced depressive symptoms had a 2.19 times higher risk of anxiety and a 1.92 times higher risk of depression. These results are consistent with our findings [17].

Emotional trauma includes not only emotional abuse and neglect but also physical trauma and severe stress events, leading to painful emotional experiences and long-term effects [18]. According to previous research, psychological maltreatment during childhood is associated with various psychopathologies including depression, anxiety, post-traumatic stress, low self-esteem, emotional inhibition, emotional avoidance, and interpersonal conflict [19,20]. Emotional trauma is a risk factor for depression and anxiety in adolescents. Previous studies have reported that early emotional trauma is a risk factor for anxiety disorders in adulthood [21]. The results of the present study are consistent with these findings. Our results indicate that offspring emotional trauma is a significant mediator of the effect of maternal depressive symptoms on their offspring depression and anxiety. Our findings are consistent with the results of a previous cohort study that reported that maternal depression was negatively related to emotion regulation in adolescent offspring and that the effects of maternal depression on offspring emotion

regulation were mediated by children's emotional trauma/maltreatment [22].

Maternal depression is directly transmitted to offspring through various biological and genetic mechanisms [23]. However, there are also psychological mediating factors in the effect of maternal depression on adolescent offspring depression, one of which is the offspring emotional trauma from the mother-child interaction. Maternal depression is a major risk factor of physical aggression, emotional abuse, and neglect in children. Mothers with depression tend to experience irritable or sad affections, express more hostile emotions towards their offspring, and struggle with consistent and positive parenting [24]. Previous research has reported that maternal depression leads to psychological aggression toward offspring, which in turn leads to internalizing symptoms in the offspring [25]. Israel and Gibb [26] reported that maternally expressed emotional criticism mediates the association between maternal depression and adolescent offspring depressive symptoms. Negative parenting and mother-child interactions between mothers and their offspring can lead to cumulative emotional trauma in the offspring, which can affect their depressive and anxiety symptoms.

However, in the present study, while the direct effect of maternal depression on offspring anxiety was not significant, the indirect effect of emotional trauma was significant. Similar to the present study, previous studies have suggested an association between maternal depression and offspring anxiety [3,17]. However, the mediating pathway of maternal depression on offspring anxiety has received less attention than that of offspring depression. Further research is required to investigate the mediating pathway of maternal depression on anxiety in offspring anxiety.

The present study has some limitations. First, as this was a cross-sectional study, it was difficult to observe causal relationships. Second, since the sample was limited to one region, making generalizations is challenging. In the future, long-term follow-up research is needed on the relationship and mediating factors related to maternal depression and emotional problems in offspring. Third, reports on maternal depressive symptoms were specific to the study period, and do not reflect specific periods such as postpartum depressive symptoms. However, previous studies have reported that current maternal depressive symptoms and chronic mild depressive feelings in mothers are more closely related to depressive and externalizing symptoms in adolescent offspring than to the timing of exposure or severity of maternal depression [27,28]. Chronic maternal depression has been reported as a risk factor for children's psychopathology [29]. Fourth, although the study had good psychometric properties, the assessment of traumatic experiences was based on retrospec-



tive reporting, which may have led to under-reporting or recall bias. Additionally, the timing of exposure, severity, and frequency of the emotional trauma were not investigated. It may have included not only pure emotional trauma but also emotional trauma caused by other trauma. Future studies should consider both the qualitative and quantitative aspects of offspring emotional trauma.

## CONCLUSION

The findings of the present study suggest that maternal depressive symptoms significantly impact depression and anxiety symptoms in adolescent offspring, and that offspring emotional trauma mediates this association. In addition to emotional trauma, further studies are needed on other mediating factors of maternal depression and mental health problems in the offspring. Interventions addressing maternal depressive symptoms and emotional trauma experiences in offspring are crucial for preventing the intergenerational transmission of psychopathology.

### Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author upon reasonable request.

### Conflicts of Interest

Duk-Soo Moon, a contributing editor of the *Journal of the Korean Academy of Child and Adolescent Psychiatry*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

### Author Contributions

Conceptualization: Na Ri Kang, Young Sook Kwack. Data curation: Bung-Nyun Kim, Na Ri Kang. Formal analysis: Jihwan Kim, Na Ri Kang. Funding acquisition: Bung-Nyun Kim. Investigation: Na Ri Kang. Methodology: Na Ri Kang, Young Sook Kwack. Supervision: Young Sook Kwack. Validation: Min Ah Joo, Duk-Soo Moon. Visualization: Jihwan Kim, Na Ri Kang. Writing—original draft: Jihwan Kim, Min Ah Joo. Writing—review & editing: all authors.

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